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FEBRIS ENTERICA SINE FEBRE.

By SIR DYCE DUCKWORTH, M.D., LL.D.,

Senior Physician to St. Bartholomew's Hospital, and Lecturer on Clinical Medicine.

J. B., æt. 16½ years, a wine-bottle labeller, was admitted into Matthew Ward in St. Bartholomew's Hospital on January 9th, 1905. He was in good health up to January 7th. On the 8th he vomited and had abdominal pain. On the 9th he had headache and was sleepy. There was nothing of importance to note in his family or personal history. He was a well-nourished youth. The pupils were large, the tongue dry, with a light brown coating. The temperature on admission was 102·4°, the respiration 30, and the pulse 112 full, soft, and regular. There was a diffused impulse at the apex of the heart in the left nipple line, fourth space, and a soft systolic murmur was heard at the apex. The lungs were free. The spleen was enlarged and tender, the abdomen not distended but slightly tender. No eruption. The stools were partly formed and dark. On the 10th January, and the following day, there was found a slight Widal reaction. The boy appeared but slightly ill. The temperature fell to normal the day after his admission, reached 100° that afternoon, and was normal again at night. On the fifth day it was 99·8° in the morning, and subsequently fell below normal till the 16th January, when it was again normal. On the 17th January, or the eleventh day of the illness, the Widal reaction was promptly manifested. No rash appeared. The stools became ochrey and powdery, but there was no diarrhoea, and latterly there was constipation. Convalescence proceeded favourably. The spleen was still palpable on the twenty-fifth day.

On February 14th the first sound of the heart was found merely prolonged. On the forty-second day some sloughs were passed attached to very constipated motions, but there

was no hæmorrhage. Rapid improvement followed. The temperature remained sub-normal till the day of the boy's discharge from the hospital on March 3rd. The urine presented no abnormal characters.

There was some doubt as to the exact date of the early symptoms, judging by the occurrence of a slight Widal reaction on the (apparently) seventh day of the disease. The illness, though decidedly marked by distinct symptoms and signs of enteric fever, was of a mild character throughout. Such cases are certainly not common. Dr. Frank informs me that they were observed in the German army during the siege of Paris, in 1871, and the apyrexia was attributed to the lowered vitality of the men at the time. Gerhardt, of Berlin, and Dreschfeld, of Manchester, have reported examples,¹ and epidemics of such cases have been recorded.

Dreschfeld regards the prognosis, in spite of the apyrexial character, as grave as in ordinary cases of enteric fever. One of his patients died from intestinal perforation, and two cases recorded by Wendland ended fatally.²

Dr. Archibald Jubb, of Glasgow,³ recorded a well-marked example of this form of enteric fever, in which the temperature remained practically normal till the seventeenth day of the illness. At that date thrombosis occurred in the left femoral vein, accompanied by pyrexia ($102\cdot4^{\circ}$ the highest point), which lasted for five days. Subsequently the temperature fell to normal, and remained so to the end of the illness. As Dr. Jubb points out, the Widal serum reaction is of particular value in such instances, rendering the diagnosis more certain, and securing for the patient early and appropriate treatment, which might otherwise be withheld in consequence of the unusual clinical features of the disorder.

¹ THE PRACTITIONER, 1893.

² Allbutt's *Syst. of Med.*, Vol. I., p. 814.

³ *Brit. Med. Journ.*, December 3, 1904, p. 1511.



STERILITY.¹

By ALEX. RUSSELL SIMPSON, M.D. (EDIN.), D.Sc. (VICTORIA),

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UNDER the designation of Eugenesis there rises up before the mind of the community nowadays a subject of vital importance from the social point of view, namely, the question of healthy reproduction. Abroad, in France and Italy especially, the attention of obstetricians and gynecologists, and physicians generally, is directed to what they call Puericulture, which is a branch of the same subject, applied more specifically to the health conditions of the unborn and the newly-born infant. From our Ward we approach this great subject from another side, namely, in considering the question of Sterility in the female, and it is to that I propose to direct your attention now.

Dr. Lochhead, our resident, finds that during the past year, of 285 married women who have come under our observation, 47 were childless, a proportion of 16·5 per cent. This proportion is larger than what obtains in the community generally among married women. For instance, Sir James Simpson found that there were 1 in 8½ married females that were infertile, and Sir Spencer Wells set down the figure as 1 in 8. In certain classes the proportion of infertile unions is even greater. In the Peerage lists you will find that the proportion comes to 1 in 6·11, so that Galton says, "I look upon the Peerage as a disastrous institution, owing to its destructive effects upon our valuable races." You will find, therefore, in your practice that you now and again are consulted by couples who have been married a year, two years, three years, and even longer, without conception taking place, or at all events no child has been born to them, and the inquiry arises, What is the cause of the sterility?

We have to bear in mind that there are two partners to the union, and some have alleged that in nine out of ten cases the fault is to be found in the wife. This is quite certainly

¹ Lecture delivered at the Edinburgh Royal Infirmary.

an exaggeration of the proportion of the cases in which the mischief will be found on the part of the female. Olshausen, in a discussion in the Berlin Society two or three years ago, rather exaggerated, on the other hand, when he said that in 50 per cent. the cause was on the part of the husband. Kehrer set down the marital proportion as 1 in 4, and in the communication which started the discussion in Berlin Jaquet found 25 per cent. attributable to conditions on the part of the husband.

Note, first of all, that you will meet with cases of acquired sterility, that are sometimes described as "one-child sterility." Of our 285 cases, there were 13 where there was this acquired sterility, where the patients had had one or two children, and remained thereafter childless. Nine of them had only one child, and though four of them had had two children, after a lapse of intervals of from two to thirteen years they had no further conception. Kleinwächter wrote an important paper on one-child sterility some years ago, and he found that there were 90 cases of this sort out of 1,081 that had come under his observation. More frequently we are consulted because of absolute sterility, as in the 47 cases I have already referred to. Of these, there were 5 who had conceived once or oftener only to be disappointed by the occurrence of an abortion, so that they were childless; the 42 had never even conceived, so that they were congenitally or absolutely sterile.

Let me first warn you that there will be cases where you may not be able to discover any local mischief. It has been supposed that in patients of this sort there is some constitutional cause. We find it, for instance, in cases of obesity, of malnutrition, and perhaps also of nerve exhaustion. Dr. Campbell, of Georgia, alleged that the over-intellectual development of American women in schools and colleges led to infertility amongst them. Dr. Mary Dixon Jones, however, has studied the subject, and shown that the intellectual development of the female as such is no impediment to her normal fertility. There is the possibility that exhaustion in the direction of brain work may be attended with sterility; but she points out that the same result may follow from overwork in muscular avocations. You will also meet with unexpected cases where there is sheer ignorance on the part of the couple. Mothers

too often fail in their duty to daughters, whom they allow to enter on the marriage relationship without letting them understand what the marriage bond implies.

Apart, then, from these possibly somewhat vague conditions, the cause of the difficulty will sometimes be found already in the External Genitals, or the Vaginal orifice. For instance, there are cases, illustrated here in the ward, where the patients have what we speak of as Dyspareunia. They have pain on coitus, and this may be, and most frequently is, due to some morbid condition of the external parts. Sometimes it is in the labia, the urethra, or the vulva; and in not a few instances there is a morbid condition of the hymen and the vaginal orifice. This presents itself to us in the form of an imperforate hymen, or of a hymen not absolutely imperforate, but so rigid that it prevents penetration. Or the patient suffers from vaginismus, when each attempt at coitus causes intense pain—pain that in certain patients lasts afterwards in the form of a kind of tenesmus. These conditions are in an appreciable proportion of cases the explanation of the infertility.

Sometimes the difficulty is found further within the vaginal canal. There are cases of imperfect development, where the vagina is not formed at all, or where it has remained imperfectly developed in this sense, that, whilst the immediate orifice of it at the hymen is perfect, above that there is a closure of the vagina generally about half an inch above the plane of the hymen. These are varieties of congenital closure—atresia of the vagina. But there are also cases where the vagina may have become closed as the result of injury or of inflammatory processes following, it may be, on a tedious labour. Where it has not become completely closed, it may have become the seat of a fistula, or the vaginal walls may produce secretions inimical to the vitality of the spermatozoa that have lodged in the cavity, or they be the seat of various neoplasms.

Then we have to keep in view the configuration of the vagina. Normally, the cavity widens from below upwards, but there are cases where it is narrow at the roof, so that the semen does not remain long enough to give the spermatozoa opportunity to pass into the uterine orifice. There are, further, vaginal displacements, such as cystocele, which is very often

associated with a rupture of the perineum. Such conditions are found in some of the cases of one-child sterility.

Far more frequently we find the cause of the trouble in the Uterus itself. The uterus is central amongst the reproductive organs, and its importance lies in the fact that it is the seat for the lodgment of the fertilised ovum and its further development. We are uncertain whether it is in the uterus or higher up in the Fallopian tubes that the fertilisation of the ovum takes place, but there must be healthy conditions of the uterus and its cavity to allow of the upward transit of the spermatozoa and the after lodgment and final expulsion of the developed ovum. The uterus may be imperfectly developed. Apart from the rare cases of total absence of uterus, not infrequently you have the organ in an infantile or pubescent form, where, perhaps, the cervix has developed, but the body of the uterus has remained small. Then there are cases of the unicornuous uterus, in which only one half of the uterus develops, and of the bicornuous uterus, where it retains the traces of its original duplicity. In some of these cases the patients may conceive, and have trouble during gestation or in labour. They are more likely to come under your observation because they are sterile. There is another condition of the uterus that has to be noted, namely, where the cervix is long, and narrows towards the orifice. You sometimes find that, where the cervix is long, the vagina at the same time is somewhat short in its course and narrow in its canal. But, even independently of that, you may meet with this elongation of the cervix; and in some cases there is such an elongation that it runs down the whole length of the vagina, and the os appears at the vulvar aperture. Further, apart from this kind of deformity of the cervix, the os externum may be stenosed with some degree of dilatation of the canal above. Or there may be a contraction in the course of the cervical canal, or at the os internum. These narrowings of the cervix and its orifices are to blame for a quite considerable proportion of the cases of sterility that will come before you where the patients have never conceived at all. Sometimes, associated with such a condition of the cervix, though it may be altogether independent, you meet with anteflexion of the body of the uterus, when the uterus is apt gradually to get into a condition of

chronic inflammation, and you have to do with more than the mere mechanical difficulty in the access of the spermatozoa. Posterior deviations of the uterus may also be found in patients who have never conceived. In a large proportion of the cases of one-child sterility, where patients have had one or two children, and then years pass without further conception, there is this kind of uterine displacement. So, also, in cases of descent of the uterus, you are apt to have an interference with the further child-bearing of the woman. Besides these deformities and displacements, we take note of the cases where the uterus is the subject of inflammatory processes. It may have been perimetritis that has led to fixation of the uterus in the pelvis, and this may bring about a displacement as well. Or we have to do with endometritis, and in a great many cases, where we have an acquired infertility, the patient is endometritic. Such a patient is very likely subject to leucorrhœa, and the unhealthy secretion is inimical to the vitality of the spermatozoa, or fails to maintain the vitality of the ovum, or, even if the ovum becomes fertilised, it is likely to be thrown off at an early period, so that she will abort without the ovum ever coming to its full development. The uterine inflammations are to blame for a notable proportion of the acquired sterilities, and you will also understand that it may complicate other causes, such as stenosis or flexion.

There are other cases where we have to do with new growths in the uterus. The commonest of the neoplasms in barren women are the uterine Fibroids. There has been some dispute as to their influence upon fertility, but my own experience leads me to state very positively that women, who are the subject of uterine fibroids, have a minus degree of reproductive power. There are other tumours besides the fibroid, although that is the one that will most frequently meet us, whether it is in the outer, or middle, or inner wall. There are also carcinomata. I do not remember ever to have seen a case where a gravid woman had a sarcoma, but pregnancy is sometimes met with in a carcinomatous patient. Such patients may be rather fertile members of the community, and become the subjects of carcinomata of the cervix after having had five or six children. They conceive when

the disease is just beginning, but in most cases, when the disease has fairly developed, conception is thereafter in abeyance.

Further, we meet with cases where the vagina is normal, and all our examination of the uterus can give us no explanation of the condition, and then we have to think of the organs above—the Fallopian tubes and the Ovaries. The Fallopian tubes are rarely absent except in the absence of other organs. Among the sexual organs they are the most frequent seat of tubercle; but apart from the development of fibroid tumours in the uterus or carcinoma in the ovaries, they are seldom the source of neoplasms. Tubal inflammations, however, are not at all infrequent, sometimes associated with other inflammations in the pelvis, especially with inflammation in the ovaries when we have to deal with what is called a case of salpingo-oöphoritis. Now, the explanation of these conjoint inflammations is to be found very often in the development in them of the gonococcus. They are the result of gonorrhœal infection, and I rather think this was in Olshausen's mind when he spoke of the marital cause being so frequent. The woman brought into the marriage contract a healthy system, with normal capability of reproduction, but her husband infected her at an early period of their marriage with the gonorrhœal virus. This comes about in a case where the husband is not the subject of a quite recent or acute gonorrhœal attack. Sometimes marriage has taken place, and you are called in after two or three months, because it is found that the wife has become the subject of an acute pelvic inflammation, and very commonly its seat of origin is in the Fallopian tubes. On inquiry into the husband's history, he will admit that years before he had been the subject of a gonorrhœal attack, and had been pronounced cured. Now and again he has a gleety discharge, and though he does not suffer from it, he has what Noegerrath described as "latent gonorrhœa," and if the secretion were examined, it would be found to contain gonococci. These lodge in the canals of the female, and undergo multiplication, first in the cervix, whence they find their way upwards to the Fallopian tubes, which become the seat of mischief. The case may come before you in any of its various phases, sometimes long after the immediate acuteness has passed off, when the

patient has been for years sterile, and very likely the subject of distressing dysmenorrhœa.

Then, besides the cases of salpingo-oöphoritis, there are certain cases where the ovaries may be inflamed of themselves, so as to have their function impaired, as in patients who have been the subjects of some zymotic fever. A young woman who had begun to menstruate, has an attack of scarlatina, and it is not noticed at the time that there was any special pelvic affection, but she finds afterwards that there is a diminution in her menstruation. In a certain proportion of such cases the ovaries had been the seat of inflammatory affections that lead to destruction of follicles, and when that has taken place, the ovum-producing organ will fail to contribute the female element for reproduction. Or, again, short of the cases where there is this kind of atrophy of the organ, the inflammation may have led to displacement of the ovary, or sometimes to a deposit on the surface that prevents the bursting of the ovisacs and the escape of the ova that are ripening menstrually. Then there are cases of ovarian neoplasms, where it becomes the seat of some cystic degeneration, or of solid growths, fibroid or carcinomatous. We have, therefore, to search all the spheres of the sexual apparatus of a female to find in certain cases an explanation of her infertility.

Now, let me ask you at this point to keep in mind that very often there is more than one morbid condition present. I have said already that, when you have a stenosis of the os, you might have an inflamed condition of the cavity of the uterus; so, when you have a morbid condition of the external genitals, you may also have some morbid state of the uterus itself. In dealing with cases of sterility, you make your careful investigation by bimanual examination, by sound, and by all the various means of gynecological exploration, until you satisfy yourselves as to the conditions that are present. Then, in dealing with them, it is usually best to begin in the order in which I began to speak of them, namely, the conditions which are most external. It is of no use, for instance, to deal with a displaced ovary or a retroflexed uterus if the patient suffers from dyspareunia. Cases of vaginismus may be quite simply and effectually cured. You have the satisfaction of relieving the patient of this suffering that comes to her

every time there is the attempt at coitus. Cure in these cases usually demands the dilatation of the vaginal orifice. The patient, of course, has to be anæsthetised ; the hymen is pared away, and perhaps the fingers introduced so as to dilate the orifice, but usually, in addition, you require to incise the mucous membrane, and cut through the muscular fibres of the constrictor vaginæ to right and left of the perineum, so as to make the aperture wide enough to introduce the fingers in a wedge shape, so that you widely distend the vaginal orifice. Sometimes there is hæmorrhage, but that is easily controlled by packing with gauze. This is removed in a couple of days, and then you must teach the patient to wear a glass or vulcanite dilator night and morning for an hour, so as to keep the orifice extended until the wound fairly cicatrizes. The patient is usually immediately relieved, and in some of them conception soon follows coition. I have in my mind just such a case where the patient also had a retroflexion of the uterus ; and in such a case you leave the patient to natural efforts for a time, because occasionally patients may have displacements of the uterus, and conception yet occur, so that, when you have cured the one condition, it may not be necessary immediately to have recourse to the treatment of other morbid conditions. But in most of them, the patient will come back after some months, and say that, while that one trouble has gone, there is still no conception.

Now, in the uterus itself, the conditions that are most amenable to treatment from this point of view, of the hope of conception, are the inflammation of the uterus, the stenosis of the os, and the displacements. Where you have to deal with the other conditions that I have spoken of, the malformations and so on, the prospect is not so hopeful, but the inflammatory processes can usually be dealt with satisfactorily by the use of hot douches, strictly carried out, the patient having the vaginal cavity douched with hot water, at a temperature of 112° to 120° , for a quarter of an hour or twenty minutes night and morning during the intervals between menstruation, and, perhaps, in addition, packing the vagina with cotton wool soaked in glycerine and 5 per cent. of ichthyol. In this way you relieve the inflammatory conditions, and in some cases conception follows. It is because of the value that some

mineral waters have in relieving chronic metritis that they have acquired a reputation for helping women to conceive. You find that patients go to certain Spas because of their sterility. It usually means that there are congestive processes going on in the pelvis, that are simply relieved by mineral water; and these are, therefore, to be borne in mind as among the measures to be recommended where you have to deal with the inflammatory processes. Further, in some of the cases you have to make direct applications to the interior of the uterus. You curette it to bring the uterine mucous membrane itself into a healthy condition, and afterwards apply iodine and carbolic acid. Again, the cases where you have stenosis of the os lend themselves to remedy in this direction. There are cases where women with a narrow os conceive, but there are others who do not conceive, and spend some years of sterile married life till the orifice is dilated. In the discussion I referred to, Jaquet showed that he had considerable success in the removal of sterility by the splitting up of the cervix on the two sides, and taking care that the wounds did not close up. Marion Sims pointed out that, in the cases where the stenosis of the external os was associated with ante-flexion, as it not infrequently is, the splitting of the cervix is best effected along the posterior wall of the cervix. Sneguireff insisted at the same time on the value of making an incision in the anterior wall of the uterus at the os internum, so as to make a straight and wide canal from the vaginal roof and os externum to the cavity of the uterus, through which there might be more easy entrance of the spermatozoa. In the cases of posterior displacement, the remedy, as I have seen in a great many cases now, is to get the uterus lifted up and then kept in position by means of a vaginal pessary. This, in many cases, is quite sufficient. In others you may require to have recourse to a more serious way of fixing up the uterus, by shortening of the sound ligaments or by ventro-fixation, but in most of the cases the rectifying of the uterus so as to keep it in its proper position gives the patient a chance of going on with her reproductive career.

show the presence of any leucocytosis. The liver, which had been considerably increased in size, returned practically to its normal proportions and the coma gradually disappeared. Shortly afterwards the expectoration suddenly became yellow-coloured, and upon examination was found to contain the various elements of bile. The pleurisy subsided and the general conditions greatly improved. There then followed a period of about four weeks during which there were frequent attacks of bile expectoration. Ascites developed, the cardiac action became greatly impaired, and death took place under appearances of marked asthenia. At the autopsy, it was discovered that the infectious cholangitis had given rise to multiple liver abscesses, one of which had broken through into a bronchus of the right lung, thereby causing gangrene and pleurisy in the territory involved, and producing the bile expectoration above noted. The case is of interest, not only because of the great rarity of thorax-liver fistula, but also because of the absence of a leucocytosis, although the process from the beginning must have been septic in nature.

Dr. Lewis Smith and Mr. H. M. Rigby reported a most interesting case (*Brit. Med. Journ.*, August 8th, 1903) of hepato-broncho-biliary fistula due to impacted gall-stones, cured by chole-dochotomy.

Etiology.—Courvoisier found in 18 autopsies, that 10 were due to gall-stones, 6 to echinococci, and 2 to ascarides. It may, however, be also due to tropical abscess or to abscess of the liver from other causes. When due to cholelithiasis, as in the case I have related, the sequence of events seems to be, abscess of liver due to suppurative cholangitis from obstruction of the common or hepatic duct, adhesive peritonitis fixing the liver to the under surface of the diaphragm, adhesive pleurisy fixing the lung to the upper surface of the diaphragm, and perforation of the abscess into the lung through the centre of the adhesions.

The pus, essentially septic from the first, continues to be offensive, as the abscess is never completely emptied.

Pleural effusion appears to be uncommon, though, in a case of Rose's, a gall-stone was found in the pleural cavity.

Occasionally the bile may be discharged into the right or left pleura, or even into the pericardium.

Treatment.—The treatment must vary with the cause. When there is merely a tinge of bile in the pus expectorated, it probably indicates abscess not dependent on obstruction of the chief bile ducts, and, unless recovery ensues within a reasonable time, it will probably be necessary to reach the abscess cavity in the liver and drain it, before cure can be expected, if posture and general treatment have had a fair trial and failed to relieve. Where the greater part or the whole of the bile is passing through the chest, it is quite clear, as in my case, that the cause must be some obstruction to the bile channels, and, in that case, it is desirable to thoroughly expose the common and hepatic ducts in order to remove the obstruction, if a removable one be found, as in the case reported by Dr. Smith and Mr. Rigby and in my own case, in both of which the ultimate issue was a complete cure.



RHEUMATOID ARTHRITIS, AND ITS TREATMENT.

BY ARTHUR P. LUFF, M.D., B.Sc., F.R.C.P. (LOND.),

Physician to St. Mary's Hospital

THE term "rheumatoid arthritis" is objectionable, as suggesting a causal connection with rheumatism. If, however, it is employed and understood as merely meaning an arthritis somewhat resembling some forms of rheumatism, the term may be retained, although the name "arthritis deformans" is less open to objection. I propose, however, in this paper to retain the term "rheumatoid arthritis," owing to its long usage, as I am afraid that the description of that disease under another and less recognised name may lead to confusion.

Rheumatoid arthritis is held by some to be a very complex disorder which has many factors concerned in its etiology. I do not hold with this view, as I consider that many forms of arthritis, especially the various forms of septic arthritis, have been classified as rheumatoid arthritis. These have no right to that name at all, and should not be confused with that disease.

Rheumatoid arthritis is a constitutional disease, not a local one—the affection of the joints is only a part, although an important part, of the morbid process. It is a disease due to the presence of micro-organisms which gain access to the blood, in the majority of cases probably through some chronic catarrh of the alimentary tract, although the invasion may occur from the nose, pharynx, or air tubes. After gaining access to the circulation, they find a suitable nidus for their growth in the joints, where they grow and propagate in the synovial membranes, ligaments, cartilages, and bones. As a result of their presence, inflammatory changes occur which result in ulceration, erosion, destruction, and, coincidentally as a rule, in hypertrophy also. During the active growth of these micro-organisms, toxins are produced and discharged into the circulation, and, by their action on the nervous system, give rise to the nervous symptoms of the disease, while the toxins acting on the vaso-motor nerves and the trophic nerves of the skin, produce the local sweatings

and pigmentation which occur in connection with rheumatoid arthritis.

The disease occurs in acute, subacute, and chronic forms, of which the chronic variety is by far the commonest. Acute rheumatoid arthritis occurs principally among children and young adults. It is rare in middle life and old age, and is met with mainly in females. The acute and subacute forms are characterised by inflammatory changes in the affected joints, by erosion of cartilages and bones, by nerve and trophic phenomena, and by glandular enlargements. The disease usually commences in one joint, commonly one of the metacarpophalangeal articulations, and then rapidly spreads to other joints. The symmetrical nature of the affection is usually well marked, and the joints are painful, hot, and present a spindle-shaped enlargement, but no outgrowth or thickening of either cartilage or bone occurs during the acute stage.

The chronic form may be a later stage of the acute disease, or, as is more frequently the case, it is chronic from the first, and occurs especially in middle life and in females. In the latter, it is specially prone to start about the climacteric period. It is characterised by progressive thickening and hardening of all the joint structures, by the lipping of cartilages, and by the development of deformities. Comparatively small injuries of a joint, especially of a small joint, may lead to rheumatoid arthritis, and to an extension of the process to other joints in a symmetrical order. The injuries are frequently the outcome of excessive work and strain, especially in elderly and enfeebled persons with a diminished power of resistance, increasing with years and with imperfect nutrition.

The affection commences with slight swelling and pain on movement. The amount of effusion into the joint is variable, and may be marked or slight. The hands and feet, especially the hands, are most liable to be first affected, and the disease then tends to advance more or less up the limbs towards the trunk, obeying, as Charcot described, "the centripetal law." In extreme cases, every joint in the body may be affected. The temporo-maxillary articulation becomes the seat of rheumatoid arthritis in about 25 per cent. of the total number of cases. At a later period the articulations of the spine may

become involved. The disease usually attacks the cervical vertebræ first, causing pain at the back of the neck, and rendering rotation of the head difficult. The dorsal and lumbar vertebræ may be next affected, so that in bad cases the spine may be converted into a rigid column. Pain may be very severe, especially at night, while, on the other hand, the case may proceed to extreme deformity without pain.

Very considerable alterations in the shape of the joints may occur from the formation of osteophytes, thickening of the capsules, and retraction of muscles. The cartilages become worn away at the centres, and the ends of the bones become eburnated by attrition and chronic osteitis. In such joints grating is readily obtained by rubbing the eburnated ends of the bones against each other. The locking of the joints, which sometimes ultimately occurs, is not due to true ankylosis, but to the presence of the projecting osteophytes, and to the thickening of the capsules of the joints. True ankylosis only occurs in the spinal column in cases of rheumatoid arthritis. Atrophy of the muscles is usually present, with contractures tending to flex the thigh, or to bend the knee, elbow, wrist, &c. There is usually some increase of myotatic irritability, as shown by some exaggeration, frequently but slight, of the knee jerks. Most persons finally reach a stage in which the disease becomes arrested, so that they are free from pain, and only are troubled with the associated crippling and consequent inconvenience.

CASES WITH HEBERDEN'S NODES.

These cases represent the mildest degree of the disease. The nodes consist of little hard swellings of the finger joints, affecting almost entirely the terminal phalangeal, and are due to a very chronic form of rheumatoid arthritis. This type is more commonly met with in women than in men, and usually at or after the middle period of life. The nodules are due to enlargement of the ends of the bones, which are frequently covered by a pouch of the projecting synovial membrane, which acts somewhat as a bursa. The joints become swollen and tender. The cartilages are softened, and the ends of the bones are eburnated. The enlargements are osseous in character, but there may be a certain amount of increase of

the periarticular fibrous tissues. After a time the disease usually becomes arrested, but the swellings remain, and eventually may cause no discomfort. Treatment cannot produce any diminution in size of the bony growths, but may effect a decrease in size of the periarticular tissues referred to.

Heberden's nodes are frequently associated with some uterine disturbance. Heberden, in his original paper, particularly noted the fact that the thirty-three cases he described occurred only in women, and in women of middle age. This form of rheumatoid arthritis touches a point of age beyond which the influence of the sexual system is likely to be much diminished, and there is undoubtedly a direct connection between it and uterine troubles associated with the climacteric. The affection is not commonly very progressive, and never reaches to much deformity ; but, on the other hand, there is no retrocession of the chronic arthritis. The uterine troubles and the active affection of the joints subside together.

PREDISPOSING CAUSES.

In the great majority of cases rheumatoid arthritis is a primary disease, but at the same time it is probable that in a small number of cases an antecedent attack of rheumatic fever, or of some form of septic arthritis, such as gonorrhœal arthritis, or even an acute attack of gout, may have left the joints in such a vulnerable condition, that they may subsequently become the seat of true rheumatoid arthritis. Any debilitating condition may predispose to this disease, and, especially of late years, I have seen many cases of rheumatoid arthritis which have followed repeated attacks of influenza. In connection with cases of rheumatoid arthritis it is not uncommon to get a history of a preceding attack of so-called "rheumatic fever," the attack being generally described as one of long duration, and as very resistant to treatment. It may be taken as almost for certain that this attack was one of acute rheumatoid arthritis, which is a disease that does not yield to salicylates as acute rheumatism does.

TREATMENT.

Rheumatoid arthritis, if left untreated, tends to spread from joint to joint, and produces progressive destruction of the joint

tissues. Occasionally treatment fails to affect any arrest of the disease, and this is especially apt to occur in connection with the rheumatoid arthritis of the old. For the successful treatment of this disease, it is essential that the treatment should be commenced while the disease is in its early stages; hence the importance of an early recognition of the malady, and of its distinction from gout and rheumatism. The treatment must be persevered in for a lengthened period of time, generally a year or two, and during the treatment everything possible must be done to increase the patient's strength, and maintain the general condition of nutrition at the highest possible level.

If rheumatoid arthritis is seen and recognised early in the acute stage it is curable. In the later chronic stages, it is possible to arrest the disease, to remove the pain, and to secure greater movement of the joints, but it is not possible to bring the disorganised and deformed joints back to their normal state. It is remarkable, however, even in many chronic cases what a considerable amount of improvement may be effected in the joints if the method of treatment presently to be described is persevered with for a prolonged period of time.

GENERAL AND DIETETIC TREATMENT.

The not infrequent mistake of diagnosing rheumatoid arthritis as gout, and the consequent placing of the patient on a restricted and spare diet, has undoubtedly led to the development of severe and incurable forms of the disease. It is essentially a disease that requires good and nutritious feeding, and I have seen many cases of rheumatoid arthritis which had gone thoroughly to the bad, through the initial error of mistaking the disease for gout, and treating it with a spare diet. The diet should be as liberal and as good as the patient can digest, and animal food should be partaken of freely, though not to the exclusion of vegetables. The exclusion of the red meats, and of such articles as sugar, potatoes, cauliflower, peas and beans, on the assumption that they do harm in rheumatoid arthritis, is, in my opinion, not only unnecessary but is absolutely opposed to the treatment I have adopted and the careful observations I have made, in the dieting of patients suffering from this disease.

A moderate quantity of wine or stout should be taken with

lunch and dinner. Any kind of wine that agrees with the patient may be taken ; but perhaps a generous red wine, such as Burgundy, is the most suitable. Woollen clothing should always be worn next the skin ; and exercise, short of producing pain, should be indulged in. A dry, gravel soil, and a warm, dry climate, are most suitable to patients suffering from this disease.

DRUG TREATMENT.

The treatment of rheumatoid arthritis by drugs must be quite different from that of gout or rheumatism, and efficient measures must be taken to improve the general condition and health of the patient. The drugs that I have found most useful in the treatment of rheumatoid arthritis are guaiacol and potassium iodide. I have now employed guaiacol in some hundreds of cases, extending over several years, and as the result of my experience, I do not hesitate to say that, if administered in sufficient quantities, and for a sufficiently long period of time, it is capable, in the great majority of cases, of arresting the disease, of diminishing the size of the joints, and of permitting increased movements. It also relieves pain markedly. It is useful in both the sub-acute and chronic forms of rheumatoid arthritis. The guaiacol probably acts by arresting further infection from the intestinal tract, and after absorption, by combining with the bacterial toxins, and assisting in their elimination. The iodide of potassium probably acts by promoting absorption of the hypertrophied fibrous tissues.

The most convenient form of administering the guaiacol is the carbonate in cachets. This salt is a white powder, which is free from the disagreeable odour, taste, and irritating effects on the stomach of guaiacol itself. In the intestines, it is slowly split up into guaiacol and carbonic acid gas. At first, from five to ten grains of the carbonate of guaiacol should be given three times a day, and the dose should be increased by one to two grains each week until from 15 to 20 grains are being taken in each dose. It is essential that this treatment should be continued for at least twelve months. The beneficial effects of the guaiacol are very much increased by administering at the same time a mixture containing potassium iodide ; the depressing effect of the iodide should be counteracted by its

combination with tonics, of which, perhaps, *nux vomica* and the compound glycero-phosphate syrup are the most useful. For the preservation of the latter, and to render the mixture palatable, spirit of chloroform and peppermint water may be employed. As regards the dosage of the iodide, my experience is that patients usually tolerate full doses from the beginning, and are much less liable to develop the distressing symptoms of "iodism" than if they are initially put on small doses. My usual practice now is to start them at once on 10-grain doses of the potassium iodide three times a day, and to continue this amount if it does not disagree.

The treatment that I have just detailed is, in my experience, incomparably superior to the prolonged treatment for two, three, or more years of such cases with small doses of arsenic and iron, a method of treatment which still has many supporters.

After the treatment with guaiacol carbonate and potassium iodide of a very large number of cases of rheumatoid arthritis, I am convinced that it is capable, in the great majority of cases, of arresting the disease, and so of preventing the frightful suffering connected with movements of the affected joints, a condition which is so common in cases of unrelieved rheumatoid arthritis. If the treatment is commenced in the comparatively early stages of the disease, then recovery with very little deformity may result (see Case 1), but even if after arrest of the disease much deformity results, very considerable mobility of the joints may be promoted by baths, superheated air, massage, and passive movements. It is frequently remarkable to find after such treatment what an amount of mobility and capacity for usefulness has been restored to joints which have been left in a severely deformed but quiescent condition.

The treatment that has just been described is especially intended for the chronic and sub-acute forms of rheumatoid arthritis, but for the treatment of the acute form of the disease during the pyrexial period, quinine is far and away the best drug.

OTHER TREATMENT.

The thermal treatment of the affected joints, either by means of baths, superheated air, or electric light baths, is most

beneficial. Douche massage is the most effective form of treatment with hot water, and perhaps next to that rank peat baths and brine baths. Electric light baths, in which the affected joints are bathed in the heat and light rays reflected from a number of incandescent electric lamps, are also beneficial in many cases.

Properly regulated movements and properly applied massage are of great use in overcoming the stiffening and fixation of the joints, and the muscular wasting in their vicinity. Massage increases the volume of blood circulating through the joint tissues, by which their nutrition is improved. It also exercises a stimulant effect on the trophic nerves, and tends to reduce any muscular spasm and to relieve pain. The absorption of recently formed adhesions is also probably promoted by massage. Massage, in addition to its local influence upon the affected joints and their proximate muscles, also improves the general circulation and the general nutrition of the body. General massage should, therefore, be lightly applied at first, little or no attention being paid to massage of the affected joints for the first few days. The form of manipulation which may be applied to the joints with the best results is *massage à friction*, which consists of the application of quick frictions or rubbings to the surfaces of the joints. In addition, gentle kneading and squeezing of the parts, particularly of the tendons and fibrous surroundings, should be effected. The effects of such manipulations are generally evidenced by the rapid absorption of exudative products in and around the joints. Active and passive movements of the affected joints should also be employed.

Counter irritation of the spine, in the form of linear blisters on both sides of the vertebral column, is of undoubted use in relieving the neuralgic pains, so frequently associated with the disease, especially in the earlier stages. The blisters should be applied to the cervical, dorsal, or lumbar region, according to the distribution of the pain.

If possible, a patient suffering from rheumatoid arthritis should not winter in this country. A dry warm atmosphere is required, which can be best obtained in Egypt and Algeria.

Appended are a few cases illustrating the effect of the treatment described in this paper.

Case 1.—Male, age 57. This patient was first seen by me five months after the commencement of the arthritis. It started in the left knee, and three weeks later the hands and finger joints were involved, and the disease then rapidly spread to the other knee, the feet, elbows, cervical vertebral, and temporo-maxillary joints. The disease had originally been diagnosed and treated as gout, and in consequence it had rapidly increased, and had assumed a very severe type, with considerable swellings of the affected joints, attended by great pain on movement. He had been for four and a half months on a very spare diet, on the assumption that he was suffering from gout. As soon as I saw him, the diet was changed to a full and generous one, and he was placed on treatment with guaiacol carbonate and iodide of potassium, which was continued for sixteen months, with an interruption of one month owing to an attack of influenza. During the course of treatment he had twelve electric light baths, and a month's course of douche massage at Buxton. After four months of treatment the joints began to improve, and from thence onwards the improvement was very rapid and marked. At the end of the sixteen months the joints had almost resumed their normal appearance, were quite mobile and free from pain. He then resumed his usual active life, and is now able to shoot, hunt, and play golf. At the end of three years he is quite well, and may be considered cured.

Case 2.—Male, age 61. This was a very severe case of rheumatoid arthritis, which began in an acute form and rapidly crippled the patient so that he had to be confined to bed. It started in the carpo-metacarpal joint of the right thumb, and rapidly involved all the thumb and finger joints of both hands, the wrists, shoulders, knees, and cervical vertebral joints. For three weeks during the acute stage he was placed on quinine and aspirin, which quickly relieved the pain, and at the end of that time the guaiacol carbonate and iodide of potassium treatment was commenced. A month later he was able to drive out and to take short walks. During the next four months, no considerable progress was made, but after that time the joints rapidly improved. He was kept on the treatment for fourteen months, and during that time had daily massage for about four months. Six months have now elapsed since he left off treat-

ment. The joints, though still somewhat enlarged, are mobile and quite free from pain, he is able to walk three or four miles at a time, and has resumed the direction of an extensive business.

Case 3.—Female, age 43. This was a case of rheumatoid arthritis of only a moderate degree of severity, but which was fortunately seen in the early stages of the disease. The finger joints, wrists, elbows, shoulders, knees, and temporo-maxillary joints were involved. There was considerable pain on movement, and the patient had been obliged to give up riding and walking to any extent. She was at once placed on the guaiacol carbonate and iodide of potassium treatment, and was kept on it for twelve months. After four months of treatment very rapid improvement of the joints set in. At the end of treatment no perceptible deformity of any of the joints remained, and they were quite mobile and free from pain. No other treatment was employed. She has now been for fifteen months in good health, and is able to walk, ride and lead an active life.

Case 4.—Female, age 24. This was a case of rheumatoid arthritis supervening in joints which had been previously affected by rheumatism. At 17 years of age the patient had a subacute attack of rheumatism, which lasted for three weeks, and, for the next seven years, she suffered from occasional attacks of articular rheumatism. When I saw her she had very definite rheumatoid arthritis affecting the finger and thumb joints, wrists, shoulders, knees, cervical vertebral, and temporo-maxillary joints. There was swelling and creaking of the affected joints, but no grating. She was able to walk a little, but had been obliged for some weeks to give up active exercise. She was placed for twelve months on the guaiacol carbonate and iodide of potassium treatment. No other treatment was used. At the end of three months the joints began to improve, and, by the time the treatment was discontinued, they had resumed their normal appearance and mobility. She is now able to lead an ordinary life, and has remained quite free from the rheumatoid arthritis for two years, although she has occasional slight relapses of her former rheumatism, which, however, quickly yield to treatment with aspirin.

Case 5.—Female, age 25. This was a case in which considerable destructive processes had occurred in the joints with

the production of many deformities. At 20 years of age she was attacked with severe rheumatoid arthritis involving all the finger and thumb joints, wrists, elbows, shoulders, knees, hips, cervical vertebral, and temporo-maxillary joints. She was treated for three years with arsenic and iron, but the joints gradually got worse. When I first saw her, at the age of 25 years, there was considerable deformity and grating in many of the joints, and the fingers were bent in various directions. All the joints were very painful, and she could only walk with difficulty. Her weight was only 4 stone, 12 pounds. She was placed for twelve months on the guaiacol carbonate and iodide of potassium treatment, and a generous dietary was ordered. At the end of that time the walking was very much improved, there was very little pain in the joints, and she was able to play the piano, on account of the absence of pain from the finger joints. The deformities of the joints and the grating remained the same. For two years she continued in this quiescent condition, and at the end of that time she had a slight relapse of the rheumatoid arthritis. She was at once placed for eight months on the guaiacol carbonate and iodide of potassium treatment. She has now been for nearly a year free from pain, and, although the deformities naturally remain the same as before, she is able to take a fair amount of exercise, and to generally enjoy life. Her weight has increased to 7 stone, 4 pounds. This case illustrates the improvement that may be effected even in long standing cases of very severe rheumatoid arthritis.



THE RELATIONSHIP OF RHEUMATOID ARTHRITIS
TO CHRONIC TOXÆMIAS.

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THE pathology of arthritis deformans consists still, for the most part, of a series of guesses and gaps. Owing to the scanty post-mortem evidence available, it largely consists of theories based upon the symptomatology and physical appearances of the disease, and deductions drawn from the pathological evidences afforded us by diseases with which it appears to have analogies.

The two theories—the infective and the neural—still have their respective advocates, but neither seems able to overthrow the opposing view.

While many of the clinical features point strongly to an infective origin, hitherto, it cannot be claimed that any specific organism is constantly associated with the disease. Careful observers, after the examination of a large number of cases, have arrived at directly contradictory results.

In 1902, Poynton and Payne isolated a diplococcus from a case of rheumatoid arthritis. By intravenous inoculation of rabbits, they produced not only a severe multiple arthritis, but also an osteo arthritis of the monarticular type.

In another case of arthritis of knee, the same observers, in conjunction with Page, found diplococci indistinguishable from those of rheumatic fever in the exudation of the knee-joints, and cultures were made. Both rheumatic and rheumatoid changes were produced by the micro-organisms injected intravenously into rabbits. Hale White also has isolated a diplococcus from the left knee joint of a case of acute rheumatoid arthritis. The organism was non-pathogenic. It was apparently not similar to that described by Poynton and Payne, nor did it resemble the more usual cocci. From the mesenteric gland in this case, a small non-motile bacillus, non-pathogenic to mice and rabbits, was isolated. It stained

by Gramm's method. Gask has isolated a streptococcus from a case of acute rheumatoid arthritis.

In 1903, Crawford and Malim, working at the Royal Mineral Water Hospital, Bath, aspirated and examined the joints in 48 cases. They embodied their results in a paper read at the Bath and Bristol Branch of the Association, but no evidence of a specific organism was forthcoming. The majority of cases proved sterile; and in the cases from which organisms were cultivated, it was thought that they were the result of accidental contamination. The strictest precautions were taken, and standardised media were used. This piece of work has unfortunately not been published by the authors. The cases in this series were of the sub-acute and more chronic type of arthritis deformans.

In 1904, a report of a series of 110 cases of arthritis deformans from Osler's clinic (Johns Hopkins) was issued by Dr. McCrae. According to this author the two principal views as to the origin of the disease are :—

1. That it is due to an infective agent (either a specific organism or a variety of organisms or their toxins).
2. That it is of neural origin.

In continuation he states that there are many clinical features suggestive of an infective origin, namely :—"The mode of onset often sudden; the fever and the increased pulse rate are all in favour of an infection."

Further on he writes :—"Could we determine a definite organism to be associated with the disease the matter is settled. In this series we have never succeeded in obtaining any results from cultures in spite of the greatest care in following the methods given for example by Bloxall."

That some of the cases in this series were fairly acute may be judged from the fact that out of 86 cases in which the temperature was recorded, "only 15 cases, or 18 per cent., had a normal temperature, and that the great majority (59) had a temperature averaging between 99° F. and 101° F. during the acute attacks. The majority (92) of the cases in the series were of the polyarticular type.

On the other hand, Schuller, Bannatyne, Bloxall and several French observers have found micro-organisms in the fluid of the joints.

Judging from the above data, it will be manifest that there is a striking want of uniformity in the results obtained by independent observers, even when working in some cases along the same line of technique. With regard to the view that the disease may be due to a variety of organisms or their toxins, much may be said in its favour. This we do know, that different micro-organisms may give rise to identical clinical and pathological phenomena as in infective endocarditis, pneumonia, &c. In other words, as Kanthack puts it :—" We may have clinical or pathological identity without bacteriological identity." Reasoning by analogy, this disposes of there being necessarily one organism only which can produce the rheumatoid condition ; and in fact the positive bacteriological data at our disposal point the other way, namely, that not one but several organisms may produce the disease. On the other hand, to establish the specificity of any one particular organism, it is necessary not only to demonstrate its constant association with the disease, but also some attempt must be made to show that it fulfils some at any rate of the conditions postulated by Koch.

Again, how are we to explain the sterility of so many cases. Judging from McCrae's results, it does not seem essential that the micro-organisms should be in the intra-articular exudations. It seems to follow, then, that the organisms in these sterile cases must either be in the synovial tissues, or else that the source of infection is remote ; as, for example, in the gastro-intestinal tract, and that the joint changes owe their origin to circulating toxins ; and these toxins possibly have some selective affinity for synovial tissues, or else we may assume that the toxins—be their source and nature what they may—act primarily on the nervous system, and that the joint changes and nervous phenomena are the result of this cerebro-spinal toxæmia, and are, so to speak, purely secondary phenomena.

The joint swellings in this case would be of neurotrophic origin, and we might account for the occasional presence of micro-organisms within the synovial cavities on the plea that their lowered vitality favoured infection. Of this we have an example in the only case of McCrae's series which came to autopsy. This was one of general pneumococcus infection with pneumococcal arthritis, occurring in a patient who had

suffered from symptoms of arthritis deformans for over two years.

Kanthack says "that the chief lesson to be derived from the study of bacterial toxicology is this—that the characteristic symptoms of any infection are due to toxins," and from the study of cases of rheumatoid arthritis at the Bath Mineral Water Hospital, I am inclined to think that the disease is closely related to the so-called chronic toxæmias; as, for example: tetany, Raynaud's disease, Graves's disease, &c.

The conflicting nature of the bacteriological evidence, coupled with Kanthack's statement as to the important rôle played by the toxins in the production of symptoms, led me to inquire as to how far the symptoms might be explained on the basis of a cerebro-spinal toxæmia. Such a view, of course, assumes the fusion of the two prevailing theories, *i.e.*, the infective and the neural. It concedes the probability of initial microbic infection, but leaves the site of the micro-organisms open to question—as to whether they are in the joints or elsewhere—but assumes that absorption of their toxins takes place.

The data, etiologic, clinical, &c., in favour of this view are :—

Firstly, with regard to the etiology. No one who examines into the etiology of rheumatoid arthritis can help being struck with its varied nature. Influenza, gonorrhœa, syphilis, acute rheumatism, have all been credited with some relationship to the disease, not to mention disorders of the gastro-intestinal, genito-urinary, and respiratory tracts.

As to what part these diseases play in the production of rheumatoid disease is undecided. Some ascribe it to lowered resistance, others to absorption of toxins from the various foci of disease, &c.

This varied etiology seems to favour the view advanced by Macalister and others :—"That rheumatoid arthritis is not an entity at all, but that it is nothing more nor less than a symptom common to several diseases, and not always due to the same cause, just as jaundice is a symptom of many diseases of the blood and liver."

Again, comparing the etiology with that of tetany, there

again we find great variety, acute fevers, scarlet fever, acute rheumatism, tonsilitis, malaria, &c.

Gastro-intestinal disorders of all sorts, disorders of the thyroid gland, pregnancy, puerperal conditions, &c.

The same definition holds here—tetany is not a clinical entity, but a symptom—complex, owing its production to a variety of diseases, the toxins of which, acting on the nervous system, evoke its clinical features. Another point in common is their affinity for certain diseases, exophthalmic goitre, epilepsy. I have reported several cases of the former in association with rheumatoid arthritis. Macalister has also drawn attention to their association in a recent article. I have also seen epilepsy in a rheumatoid patient. The most suggestive affinity is, of course, the one for exophthalmic goitre, because of the well-ascertained relationship of tetany to affections of the thyroid. With regard to the etiology of Raynaud's disease—here again we find the main characteristic to be its variety—*i.e.*, a symptom complex whose manifestations are ascribed by some to a heightened reflex excitability of the cord dependent upon various sources of toxæmia. Macalister has noted the striking similarity that obtains between the previous histories of some cases of rheumatoid arthritis and some of Raynaud's disease.

I would draw attention to the occurrence of these local asphyxias and syncope in chronic Bright's, pernicious anæmia, chronic intestinal obstruction, malaria, &c. Note also their occurrence in Graves's disease. The affinity which these various toxæmias appear to have for the nervous system is also suggestive. Charcot drew attention to this predilection as regards Graves's disease, and Joffroy has reported, I believe, 6 cases, in association with *tabes dorsalis*.

Finally, a brief mention of the pathology of the chronic toxæmias:—It is, I think, worthy of note that posterior sclerosis has been found in ergotism—a disease closely allied to tetany. Macalister thinks it probable that the toxins in some cases of rheumatoid arthritis resemble ergot in their action. The same cord lesion has been found in pernicious anæmia, diabetes, also in rheumatoid arthritis.

McCrae has also been struck with this conformity to the chronic toxæmias, and asks the question:—"May not the

chronic cases of arthritis deformans with suggestive nervous manifestations possibly belong to the same class ?”

As regards the clinical symptoms, I shall confine my attention mainly to the consideration of the early or prodromal symptoms, with reference to any points of analogy between them and those furnished by other chronic toxæmias.

That there are prodromal symptoms in rheumatoid arthritis is, I think, an important argument in favour of the disease being of the nature of a cerebro-spinal toxæmia.

These prodromal symptoms antedate the appearance of periarticular swellings by an indefinite period. They consist of vasomotor phenomena, motor, muscular spasms, and pareses, sensory, pains and paræsthesiæ, increased tendon reflexes.

Collectively looked at they all possess one feature in common—they appear to stand in intimate relationship to the joint troubles ; inasmuch as their manifestations are usually confined to, or are more marked, in those areas in which periarticular swellings subsequently develop.

As regards their relative incidence or absence in any given case, they vary greatly. One or other symptoms may be absent, and of those present one symptom usually stands out more prominently than its fellows.

Thus as regards the vasomotor phenomena and muscular cramps, one or other may be more prominent, and thus we may get a condition clinically indistinguishable from Raynaud's disease, or one closely resembling a paroxysm of tetany. I have before drawn attention to the importance of these initial symptoms. Macalister says of the vasomotor phenomena :—“They are not infrequently very early symptoms of rheumatoid arthritis, and exist long before the joint troubles begin.” He also noted their similarity to Raynaud's disease. The same author on the subject of muscular cramps says :—“If we inquire carefully into the histories of patients, we find that they are very common indeed, but they have not received the recognition as initial signs of the disease which they should have received.” Trousseau also noted in his article on Nodular Rheumatism, “that sometimes muscular contractions show themselves before the joints become much affected, and it is not unusual to see them go on increasing long after the joints have ceased to be the seat of pain.”

In comparing clinically these three diseases, rheumatoid arthritis, Raynaud's disease, and tetany, we find, in addition to the resemblances above alluded to, this clinical fact common to all, namely, that all of them may be attended by peri-articular swellings. Now if we are content in tetany—an avowed toxæmia—to ascribe these formations to “trophic and vasomotor disturbances of innervation,” and also as far as I can ascertain in Raynaud's disease likewise, why not admit the possibility in the case of rheumatoid arthritis?

It seems to me that, given any case of tetany or Raynaud's disease with periarticular swellings, it would be very difficult to clinically differentiate between either of them or between them and a case of early rheumatoid disease. I have seen such cases which might have indifferently been labelled—Raynaud's disease with periarticular swellings, or rheumatoid arthritis with Raynaud-like paroxysms, and the same with regard to tetany.

How can we best explain this overlapping of these three diseases—this erratic trenching of one upon the clinical territory of the other, this similarity of clinical expression? Are we not justified in claiming a kinship for these three diseases, a common mode of genesis, a cerebro-spinal toxæmia, which provides that, however diverse the etiology or the sources of toxæmia, they shall exert their influence *via* one controlling medium—the nervous system; hence the strong family likeness running through the three diseases.

Muscular paresis is sometimes, as pointed out by Spender, an initial symptom in rheumatoid arthritis. It is often very sudden in its appearance. In some cases the lower limbs of a patient may give way suddenly. This symptom occurs also in Graves's disease. Muscular atrophy may antedate joint swellings, as has been observed by Spender and others in asymmetrical cases. This seems to point against its being due to disuse or of the nature of reflex arthritic muscular atrophy.

As regards the increased reflexes. In 1902, in a paper entitled “Reflexes, their relation to Diagnosis in Rheumatoid Arthritis,” I endeavoured to point out the following facts: that the deep reflexes, in asymmetrical cases, were always increased on the side with the joint swellings as compared with the other; that such increase was not constant, but that it rose and waned in accordance with the joint troubles; that the

superficial reflexes on the other hand were very variable, with the exception of the cremasteric, which seems as a rule to be exaggerated ; and I also noted the segmental distribution of the reflexes, as, for example, the gluteal and plantar reflexes, which showed a striking harmony in their reactions, and this independently of, and often in marked contrast to, the cremasteric on the same side.

McCrae on this point states "that the general rule seems fairly well established, that the reflexes in association with affected joints are usually increased. This was very evident in some of our cases where the involvement was asymmetrical. On the side affected the reflexes were exaggerated, but normal on the sound side. Whether the explanation lies in the changed local conditions or alterations in the cord seems difficult to say.

"In addition to the deep reflexes the superficial ones are often much exaggerated, which we have found especially true of the cremasteric reflex. This rather speaks for other than a local cause." He also noted that "the association of the reflexes often follows their segmental distribution."

It is interesting to note that Professor Gibson had previously pointed out in cases of sciatica this remarkable exaggeration of the cremasteric reflex, and this independently of the behaviour of the deep and other superficial reflexes in the same limb. I have been able to confirm this fact myself when dealing with cases of pure sciatica. He concluded "that in sciatica the segments of the cord above the level of the lumbo-sacral are in a condition of excessive irritability."

The interest and importance of this symptom in sciatica are enhanced when we remember that sciatic pain is not infrequently a precursor of rheumatoid arthritis.

Renewing our comparison with tetany we find, according to Risien Russell, that the knee-jerks may be normal in some cases, exaggerated in others, in others greatly diminished or unobtainable.

The last condition is, he thinks, more often due to muscular spasm than to a central or peripheral defect in the reflex arc. In some cases of chronic ergotism, with absence of knee-jerks, posterior sclerosis was found.

This behaviour of the knee-jerks is quite parallel to what we find in rheumatoid cases. As McCrae, in summing up,

says: "Practically the reflexes in different cases have been exaggerated, normal or decreased, but rarely absent." Such was my experience, and I ventured to suggest that this variation stands in some relation to the varying degrees of toxæmia.

Now, while it is permissible, in the early stage of rheumatoid arthritis, to ascribe the variations in the reflexes to varying degrees of toxæmia, it is not easy to explain the exact way in which it acts. Do the toxins act upon the upper or lower motor neurons or both, or can it be explained in any other way? In support of the irritation being peripheral, we can instance the fact that an increase in myotatic irritability has been noted in early stages of multiple neuritis; but even as the poison in tetany probably acts on the cells of the anterior cornea as well as the peripheral nerves, so it may do in multiple neuritis and rheumatoid arthritis. Furthermore, we know that in lead poisoning there are central as well as peripheral lesions.

When we come to deal with old chronic rheumatoid patients with widespread tonic atrophy of the muscles, and greatly increased jerks, the variability of the jerks vanishes and they remain permanently exaggerated. Clinically they remind one of amyotrophic lateral sclerosis, and it is well to remember that joint lesions have been recorded in that disease.

The fact that posterior sclerosis has been found in rheumatoid disease does not negative the possibility of the jerks in long-standing cases being permanently increased, as we know that increased jerks may be present in cases of combined posterior and lateral sclerosis; and such a combined sclerosis has been met with in a case of chronic rheumatoid arthritis.

As regards the sensory symptoms and paræsthesiæ, space precludes my entering into much detail, but I would like to point out that they are attended in some cases by objective sensory changes. Furthermore, in some cases they tend, like the reflexes, to follow a segmental distribution rather than a peripheral nerve course, and in this respect the distribution of the joint swellings follows suit. McCrae has also noted the tendency to segmental distribution on the part of the joint swellings in the fingers.

Again, in continuation of our comparison with other toxæmias, I would point out their tendency to be complicated by sensory phenomena which occur in tetany, Raynaud's

disease, pernicious anæmia, &c. Raynaud himself pointed out that, in the disease named after him, the pains of local asphyxia were not propagated along recognised nerve-paths.

In conclusion, I would draw attention to the importance attaching to the early recognition of these initial prodromal symptoms, as they afford us an opportunity of dealing radically with any concurrent disorder, and of thus possibly averting the graver sequential phenomena.

As regards the pathology, it cannot yet be claimed that there is such a disease as acute specific rheumatoid arthritis, neither, I think, can any sharp dividing line be drawn between the acute and more chronic types of the disease; for in the same way as other chronic toxæmias—tetany, for example—show infinite gradations as regards the severity of their clinical features; so also do the more acute forms of rheumatoid disease shade imperceptibly into the sub-acute or more chronic forms.



THE TEACHING OF CYSTOSCOPY, WITH SPECIAL
REFERENCE TO THE USE OF THE CYSTOSCOPE
IN THE DIAGNOSIS OF RENAL DISEASE.¹

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Surgeon, Glasgow Royal Infirmary.

[With Plates I.—IV.]

GENTLEMEN,

WHEN you elected me to occupy this chair, now nearly two years ago, you not only conferred upon me the honour of presiding at your meetings, but you also granted me by use and wont the privilege of addressing you upon a subject of my own choice.

The topic which first suggested itself to my mind was one which has occupied my attention during the last few years, namely—"The diagnosis and treatment of tuberculous disease of the urinary tract in its early stages." Having lately seen a number of cases illustrative of the subject, I am almost sorry that I departed from my original purpose, but I think you will agree with me that the present demonstration is more suitable to the occasion. At a future meeting I hope to have the honour of showing you some of the work I have been doing in relation to the treatment of early tuberculosis.

No physician would consider himself justified in pronouncing a diagnosis of a morbid condition within the thorax, without carefully inquiring into the physical signs; upon symptoms alone he would not rely. It is only by a well-cultivated power of hearing through the stethoscope that he can with precision deal with the diseases of the heart and lungs. To the surgeon who has to diagnose diseases of the bladder and kidneys, the employment of the eye by means of the cystoscope occupies a similar position. When introduced, not at first only, but for many years, the stethoscope was regarded as a plaything, and while many could listen, few could hear and understand. The same with the ophthalmoscope and the laryngoscope, and why? Because the practitioners of the time were unfamiliar with physical methods, and the qualified teachers were few.

¹ Presidential Address at the Glasgow Medico-chirurgical Society.

Now experts are numerous, and these instruments are in the hands of every practitioner and student. But what of the cystoscope, now 25 years old? It is a toy in the hands of some, and an instrument of precision with only a few, who have 'had opportunities of becoming expert in its use. Not only is the instrument a difficult one to use, but experience is required in order properly to appreciate its full value, and to justly judge what is presented by it to our view—it is one thing to look, another thing to see.

The cystoscope has now gained for itself a hardly earned and well deserved place as an instrument of precision. Only those who have closely followed the literature of the subject are fully aware of the strong opposition offered against its use. In the past this has been largely due to the difficulties experienced in teaching the subject, and in demonstrating the appearances observed. Hitherto it has been found very difficult to show others what one sees, unless the lesion is of a gross nature. The slightest movement of the cystoscope in the passing of it from the hands of one observer to another changes the field of observation. Consequently the student may not see what his instructor desires him to observe. He is apt, in receiving the cystoscope, either to push it further into the bladder, or to withdraw it slightly. This is the strong objection to the use of the ordinary cystoscope for teaching purposes. Now, however, the difficulty has been overcome. The instructor and the student may examine the object under review simultaneously. Hirschmann, the well-known surgical instrument maker in Berlin, has made to my order a wash-out cystoscope with a double objective by which two observers can see the same object at one time.

The use of this instrument I will illustrate presently.

In many diseases of the kidney the *symptoms* simply point the direction in which information may be obtained, nothing more. For example, pain and bleeding may originate in any portion of the urinary tract, but, while in many instances the character of the hæmorrhage and the situation of the pain correctly indicate the nature and site of the lesion, in others they seriously mislead, unless resort is had to physical proofs to guide and correct the conclusions deduced from the subjective symptoms.

One of the methods employed to eliminate the difficulties in the diagnosis between bladder and kidney diseases is a cystoscopic examination of the bladder, including the appearances of the orifices of the ureters, and the nature of the fluid escaping from them. The facts revealed by the cystoscope, combined with the information that may be obtained from bacteriological research, chemical examination, radioscopy, and segregation of the urine, added to ordinary clinical enquiry, enable us to advise operation, or to refuse it, knowing that we have employed all the methods to our hand.

Before many years pass, I have little doubt that the surgeon who attempts to diagnose diseases of the bladder, and certain diseases of the kidney, without using his cystoscope, will be as lightly regarded by his compeers as is esteemed to-day an oculist who professes to diagnose disease within the chambers of the eye without an ophthalmoscopic examination.

The majority of surgeons recognise the use of the cystoscope in its application to vesical disease, even although they may not practise its use, but few fully appreciate its value in gaining information regarding renal lesions. It has been my routine practice to make an examination of the bladder of all renal cases prior to operation, almost as regularly as I examine the urine, and I am convinced that by so doing I have been saved from many fallacies in diagnosis and errors in treatment.

In describing the apparatus, I shall limit your attention only to the appliances which I have personally found most useful and successful.

For cystoscopic examination a reliable battery is of the first importance, one that will be ready for use at all times, and one which does not deteriorate by lying unused. Primary batteries and dry cells do not fulfil the requirements of men who are using them only occasionally. They are irregular in their action, rapidly deteriorate when not in regular use, and are constantly going out of repair. An arrangement of secondary wet cells, which I devised and have used for over seven years, answers admirably, and during that time the battery has not failed me on a single occasion, whereas prior to finding out the way to work cells by the method I am about to describe,

constant trouble was given even by the best primary and secondary batteries procurable.

The battery¹ consists of 4 cumulator cells, the glass or celluloid baths of these measuring 9 in. \times 5 in. \times 1½ in., and they are mounted in a teak box, so that the condition of the plates and the cells can be seen at any time, and if required a fresh supply of acid can be added without disturbing the connections. Between the plates, sheets of porous porcelain are introduced to prevent buckling. This accumulator is suitable for most surgical purposes where electricity of moderate voltage and ampereage is required. By means of a special arrangement of plugs the voltage can be made 2 volts, 4 volts, or 8 volts, as required, and with the rheostats the strength of the current can be regulated to the most minute point. The power of the cumulator is an 8-volt current of 20 ampere hours, 4-volt current of 40 ampere hours, or 2-volt current of 80 ampere hours. The electrodes of the individual cells are conveyed up to a switchboard, and the terminals of the cells when combined are carried to 2 rheostats, one at each end of the case, one rheostat of low resistance for the low tension currents, 2 or 4 volts, the other a high resistance rheostat for the 8-volt discharge, the former is used for cautery work, the latter for the light. This arrangement of a switchboard enables the voltage to be carefully regulated and prevents wastage of electricity, but in its use care is required. For an 8-volt current the negatives and positives are coupled together. For the 4-volt current 4 negatives are coupled, two at each end of the battery, while in the centre one negative and one positive are connected. For the 2-volt current all the negatives and all the positives are coupled together. Care must be taken not to make a short circuit by placing a plug making three connections between two cells, that is to say, both a diagonal and a parallel connection between two cells. Should only one change in voltage and ampereage be required—the one 8 volts of 20 ampere hours, the other 2 volts of 80 ampere hours—then a switchboard may be used. In place of having a plug board a simple switch is used.

¹ Made by Mr. Trotter, Optician, 40, Gordon Street, Glasgow.

What are the points required in a cystoscope? (1) Comparatively small lumen of the stem so that the instrument may be introduced without injury to the urethra or to the neck of the bladder; (2) large field of vision and a clear view; (3) easy means of clearing the field, should it become obscure, without removing the stem of the instrument from the bladder; (4) good illumination without danger of scalding the mucous membrane of the bladder; (5) ease in sterilising the instrument; (6) facility in emptying the bladder, should there be clamant call to urinate, without necessitating the removal of the cystoscope; and (7) ability to demonstrate to a second observer the object seen. The cystoscope (Fig. I.) fulfils all these requirements. To the end of the hollow stem A a cold lamp B (Löwenstein's) is fixed, and immediately behind the lamp is a window C. At the other end of the stem is a pack box D, and passing from it at right angles, a tube E, into which a movable handle F may be fixed. Before the cystoscope is introduced the tube G is passed into the stem A, so that the part H acts as a shutter to the window C. After the cystoscope has entered the bladder, the tube G is rotated half a circle, and the cystoscope is converted into a wash-out catheter. The double-action stop-cock H should then be fixed to the tube at I, so as to regulate the direction of the flow of fluid. A rubber tube leading to the limb K should contain solution under fluid pressure of a two-feet column: while a rubber tube leading from L should contain fluid having suction of a two-feet fall. The former for ingress, the latter for exit of solution from the bladder. This part of the apparatus practically affords a wash-out catheter by which the bladder is cleared prior to the introduction of the telescope M. Prior to introducing the cystoscope, however, the lamp must be tested and the rheostat adjusted. When the bladder has been washed out, and is distended to the required extent, the tube G is withdrawn and replaced by the telescope M, so that the prism N comes to be immediately opposite the window C. The electrodes are introduced into the openings O and P, the circuit completed by pressing the switch R against the body of the cystoscope, the lamp is lighted, and the observation made. Should the fluid become opaque before the examination of the bladder is completed, the bladder may be rewashed by with-

drawing the telescope and reintroducing the tube G without moving the stem of the instrument. This instrument differs from the ordinary cystoscope also in that two eyepieces may be screwed on to the telescope (a), one S, a single (a_1), the other T, a double eyepiece (a_2). In the latter the image is reflected into a second eyepiece at right angles to the shaft of the cystoscope so that a student can look through this second eyepiece (x) while his instructor is making observations through the first eyepiece (y). The surgeon seats himself in front of the patient in the usual way, and while he is making an inspection of the bladder and describing it to the student, each feature presented is as clearly seen by the second party as by the first. This invention greatly facilitates instruction in cystoscopy. It is a combination of Schlagintweit's and the Casper-Hirschmann's, with modifications.

Another embarrassment experienced in teaching the subject is the great difficulty in procuring good coloured illustrations. I have frequently attempted to show objects by means of the magic-lantern, but to teach a magic-lantern-slide artist to appreciate what is to be seen through the cystoscope has been beyond my power. In the first place, magic-lantern-slide artists are few in number, and those who have come within my ken have shown very little interest in cystoscopy. Ordinary colour artists appear to be more ambitious and more willing to help. Mr. Alexander K. Maxwell, whose productions I will show you this evening, has shown considerable aptitude in appreciating what is to be seen by the cystoscope, and by means of an opaque projector, made for me by Mr. J. Trotter, throwing images on a screen, I shall demonstrate to you a systematic examination of the bladder, a number of lesions indicative of bladder diseases as well as of renal affections. A short description of the projector may be of interest to you.

The opaque projector is a very simple apparatus. It consists of two lime-light lanterns which throw a strong light on an opaque object at the back of the projector. The light from the object is reflected through a series of lenses on to a translucent screen, made of tracing paper, a clear disc encircled by black, and seen by the audience by transmitted light. Any object held at the back of the projector can be shown by it, so that no special slides are required.

PLATE I.

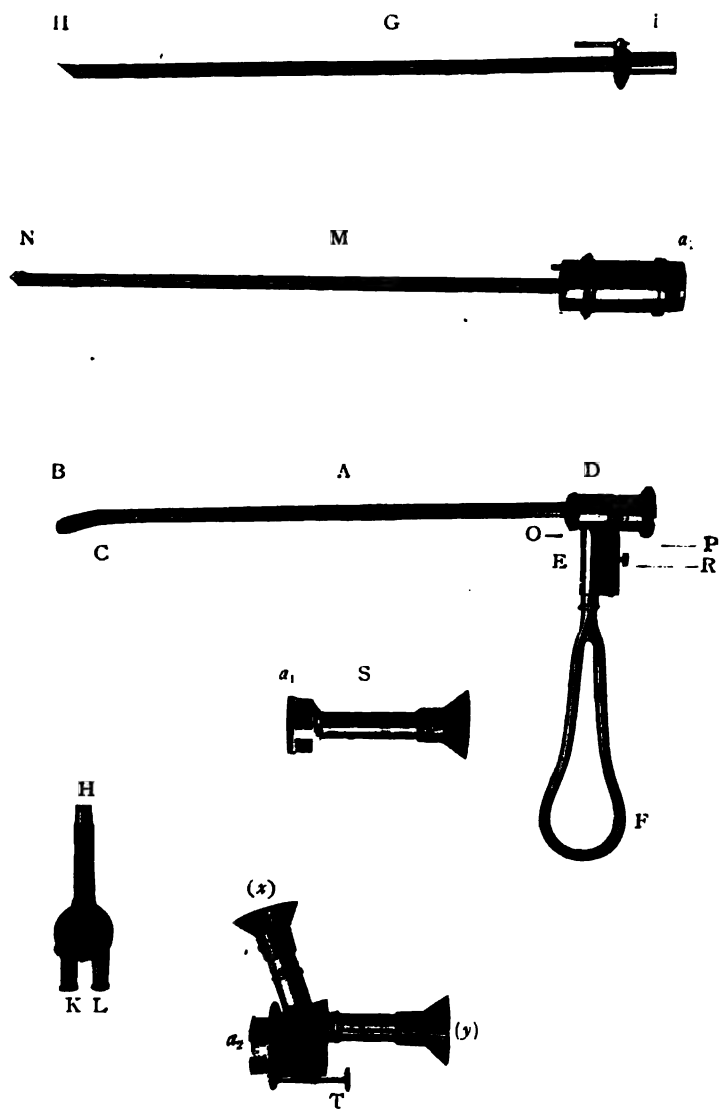


Fig. I.

PLATE II.

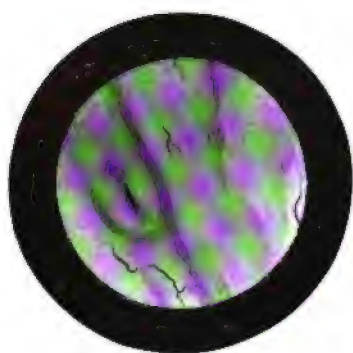


Fig. II.



Fig. III.



Fig. IV.



Fig. V.



Fig. VI.



Fig. VII.

PLATE III.



Fig. XII.



Fig.

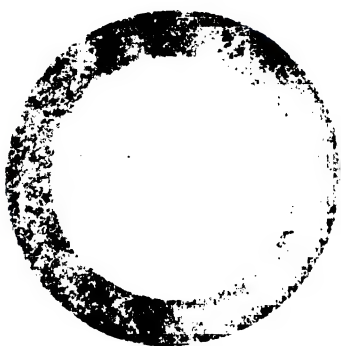


Fig. XIII.

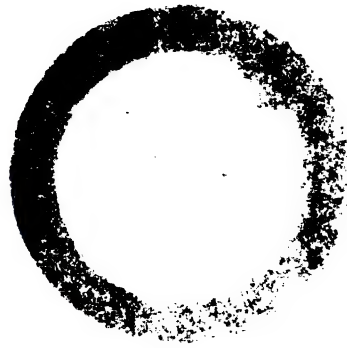


Fig. 1.

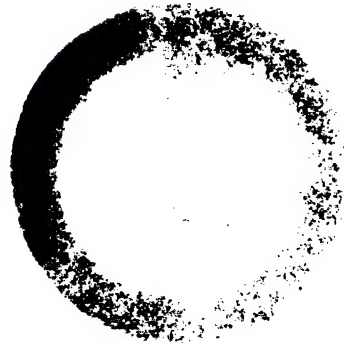


Fig. 2.



Fig. 3.

PLATE III.

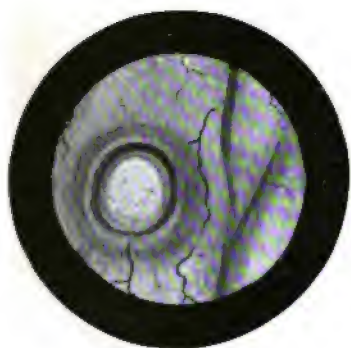


Fig. VIII.



Fig. IX.



Fig. X.

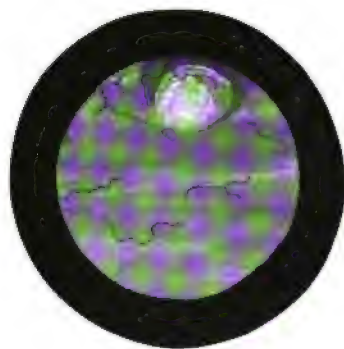


Fig. XI.



Fig. XII.

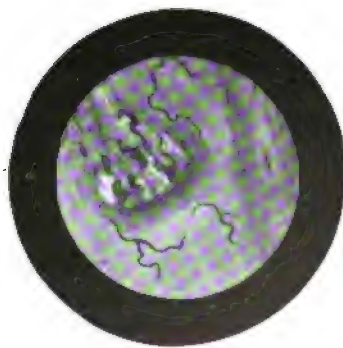


Fig. XIII.

PLATE IV.



Fig. XIV.



Fig. XV.



Fig. XVI.



Fig. XVII.

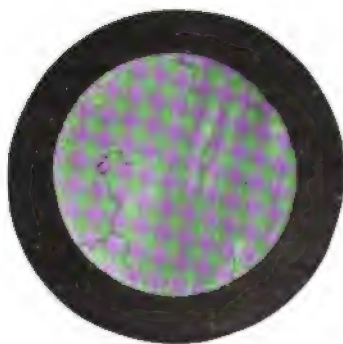


Fig. XVIII.



Fig. XIX.

As shown to you this evening, the illustrations are painted on a large scale, and by moving the objects behind the projector I shall be able to give you a very exact impression of what is seen in rotating the cystoscope within the living bladder.

This large diagram shows the whole area of the bladder, and represents the conditions seen when it is distended with eight ounces of fluid, the quantity we usually employ in making an examination. When the lamp is lighted the prism of the cystoscope is directed towards the anterior wall and the first object which attracts attention is an air bubble ; it acts as a polar star and is useful as a guide in locating lesions.

Viewed during life, the appearance of the mucous membrane of the bladder is seen to vary greatly both in form and colour. These variations depend upon many circumstances, but one only shall I refer to, namely, the degree of distension of the viscus. When well filled, say to the extent of 16 ozs., its mucous membrane is of a pale yellowish-pink colour, is attenuated and free from folds, the blood vessels are hardly perceptible, the lips of the ureters become obliterated, and the orifice flattened ; but if by slow degrees the contents are permitted to escape, the colour brightens, and the mucous membrane gradually appears more bulky. At first small and later large folds appear, the blood vessels slowly become more and more apparent, the lips of the ureters become pronounced, and the orifices distinct. A fully filled bladder is anæmic ; one moderately distended is well supplied with blood ; an empty one is congested. These conditions must be considered in making observations. In a partly distended bladder the folds of the mucous membrane may hide lesions, consequently never be satisfied by one examination or one degree of distension only. The appearances presented by the trigon and by the ridges corresponding to the lines of the ureters also vary in different individuals, and according to the degree of distension. In many instances when the bladder is well distended the ridges of the trigon are hardly apparent, and the orifice of the ureter appears to lie upon a flat surface. In other cases the ridges limiting the trigon are pronounced and the openings of the ureters are situated upon distinct eminences. Between these two extremes there may be

innumerable gradations. By means of the opaque projector I can give you a fair idea of what is seen in examining a healthy bladder.

With moderate distension the mucous membrane is well coloured, is occasionally thrown into folds, blood vessels are seen on the surface, and the lips of the ureters are thick and pronounced. Before describing the morbid appearances found in the bladder in renal disease, I shall endeavour to illustrate a few of the grosser, and therefore more easily recognised, diseases of the vesical mucous membrane, such as hyperæmia, varicose veins, hypertrophy of the muscular tunic, sacculation, tuberculosis ulceration, and afterwards I shall show you a stone, and tumours of the bladder, such as fibroma, sarcoma and carcinoma.

Figure II.—Represents the appearances of the orifice of the ureter in health in a bladder distended to six ounces. The mucous membrane is pale in colour, and is ramified by a few small sized arterioles. The ridge of the trigon is marked, the lips of the orifice are distinct, and the opening is easily seen. Observe, not only the form, but also the colour.

Figure III.—Varicose veins occupying a portion of the trigon of an otherwise healthy bladder, and giving rise to occasional hæmaturia unaccompanied by any other symptom. The patient from whom this illustration was taken was a man, æt. 43, who, prior to consulting me, had noticed that occasionally, during the previous 18 months, a few drops of blood-stained urine escaped at the end of the stream. This alarmed him, and, being anxious to find an explanation, he asked a cystoscopic examination. On inquiry I found that he also suffered from internal hæmorrhoids and habitual constipation. The hæmorrhoids were removed and the constipation remedied, and within two months the hæmaturia disappeared. I show you this view, as one of the rarest causes of hæmaturia. Dilatation and varicosity of the veins of the bladder occur seldom, and then almost only as a consequence of obstruction to the blood flow by pressure from tumours within the abdomen.

Figure IV.—Hypertrophy of muscular coat and hyperæmia in a case of enlarged prostate. The case was one of enlargement of the middle lobe of the prostate in a man 63 years of age, and on examination the whole of the bladder, with the

exception of the trigon, was seen to be traversed by prominent tuberculæ, which suggested the appearance of the interior of the ventricle of the heart. These bundles of muscular fibres raised the deeply-injected mucous membrane into elongated prominences, and also caused the ridge of the trigon to be exaggerated. While the blood-vessels were numerous and distended, the mucous membrane was deeply pigmented and atrophied.

Figure V.—Sacculation of the bladder. The bladder presented appearances similar to the one just described, with the exception that the mucous membrane was paler in colour, and not atrophied. Two small pouches are seen at the base of the bladder, just outside the mouth of the left ureter, the mucous membrane being pushed outwards between the hypertrophied muscular tuberculæ.

Figure VI.—Recent tuberculous deposit close to the neck of the bladder. The case was that of a young lady, aged 19. The symptoms did not point to any serious bladder lesion, the only inconvenience complained of being frequent micturition. The urine contained a trace of albumen, tubercle bacilli were found in considerable numbers, it deposited a minute quantity of pus, but no tube-casts were discovered. The kidneys were free from disease, and no evidence of tuberculous disease could be discovered except in the bladder. The mucous membrane of the bladder was moderately injected, and the vessels in its walls were more numerous and larger than normal. Extending along the floor of the bladder from a little below the orifice of the left ureter to the neck of the bladder there was a pale mass, like œdematous granulation tissue, and in it a number of small, white, caseous points were seen; these were tubercles just beginning to break down. There was no distinct ulceration. Two years ago the urethra was dilated, and the whole of the tuberculous deposit was removed with a curette. The bladder was washed out regularly for ten days, after which nitrate of silver solutions, of varying strength, were injected at intervals. The patient made a good recovery, and there has been no recurrence of the disease.

I can only very briefly refer to the most obvious advantages of the cystoscope in the diagnosis of the vesical calculus.

They are well illustrated by the following four cases in which the presence of stone could not be detected by other means. From their position they either could not be touched with the sound, or were so covered and protected that the sensation conveyed to the hand of the observer failed to be that characteristic of stone. In cases Number VII., VIII., and IX., the bladder had been previously examined by surgeons of large experience and no stone was found. By sounding alone, a stone may very easily be missed even by the most practised hand, but by employing the cystoscope not only the presence of the stone was discovered, but its exact situation, its form, and its probable composition were determined.

Figure VII.—The case was sent to me by a well-known surgeon, with a history of chronic cystitis, pain, frequent micturition, pyuria, but no hæmaturia. He indicated a diagnosis of septic infection, but the idea of the presence of a stone did not occur to him, nor did I suspect it. On cystoscopic observation I found a white woolly mass occupying the floor of the bladder, the shape of a pigeon's egg and about the same size. From its appearance and form, one suspected the presence of a stone, but on passing a sound into the bladder no hard object could be found. Instructions were given to have the bladder washed out regularly twice a day for a week. At the end of that time another examination was made, and a clear phosphatic stone was found lying in the floor of the bladder covered with flaky mucous. In this case the stone had become completely enveloped in a mucous coating of considerable thickness, so that a sound could not possibly convey to the hand or to the ear the impressions we usually expect in a vesical calculus.

Figure VIII.—The stone may also be obscured by the concretion forming in a saccule or diverticulum from the bladder wall. In such cases it is difficult to determine whether the diverticulum is caused by the stone, or is the stone the result of the diverticulum, but so far as clinical observation is concerned, the practical difficulty is to discover the presence of the stone.

A case of this kind occurred very early in my professional career. It was that of a well-known Glasgow merchant who suffered from chronic and persistent bladder irritation. He was examined by Lord Lister when he was Professor of Surgery in the University of Edinburgh, and by Sir Henry Thompson,

and neither of them detected the presence of a stone. George Buchanan, who was then Professor of Clinical Surgery in Glasgow University, passed a sound into the bladder, and found a stone, but before operating he considered it judicious to make a second examination, and in doing so no stone could be found, therefore no operation was performed. The patient died many years afterwards, and at the post-mortem examination three sacculi were found with small orifices. One of those contained a stone. The point of Professor Buchanan's sound happened to touch the stone on one occasion only. That was a matter of chance. Had the cystoscope been in use at that time, they might have looked and probably seen the stone. Figure VIII. illustrates a case of this kind. The mucous membrane of the bladder is practically normal. The colour, except immediately around the opening of the sacculus, is pale, but the lips of the opening are deeply congested, rounded, thickened, and in contrast to the bright red lips of the orifice a pale white object is seen. In such cases the difficulty is to determine whether such a white object is a stone or a tubercular ulcer covered with a slough, but by passing the finger into the rectum or the vagina, while at the same time observing through the cystoscope, if the object is a stone the bladder wall is pushed forward in a degree represented by the size of the stone and not by that of the point of the finger.

Figure IX.—Stones hidden behind the prostate are difficult to detect with the sound, unless the patient is placed in the Trendelenburg position. With the cystoscope the stone may be readily seen. Figure IX. represents the position of the stone behind an enlarged and greatly congested prostate.

In the case from which the drawing was taken, the medical attendant recognised the presence of the enlarged prostate and suspected, but was not sure of, the stone. I passed a sound and failed to discover any stone, but on using the cystoscope it could be clearly seen and was readily removed.

Figure X.—An account of this case I shall give further on. It was one which I showed at the Society on the 4th of November last.

Figure XI.—Pedunculated fibroma on anterior wall of bladder, removed by suprapubic cystostomy. The mucous membrane was deeply injected. The urine was normal, except

on three occasions when it contained blood : the last hæmaturia was considerable, and led to a cystoscopic examination when the tumour was discovered.

Figure XII.—Sarcoma of Bladder. This tumour of the bladder is very rare. The case was one of a man, aged 26, who had been operated upon several times for "recurrent fibroids," one on the right knee, a second on the hip, and a third on the right lumbar region. When I saw him for the first time, there were seven such tumours below the level of the waist, and one over the left shoulder in front. He complained of frequent and painful micturition, and had occasional attacks of hæmaturia. Cystoscopic examination revealed a large rounded tumour on the anterior wall of the bladder. In colour the surface was mottled blush-red, and there was an irregular lozenge-shaped pale blue patch almost in the centre ; over the surface there was a large number of small capillaries. The mucous membrane was deeply injected and the vessels dilated.

In the circumstances an operation was deemed inadvisable, but a section of the tumour *post mortem* showed it to be a round and spindle-celled sarcoma.

Figure XIII.—Carcinomatous ulceration at the base of the bladder. In this case the point of interest was that, while the bladder symptoms were insignificant, and the ulcer in the bladder small, the primary vesical lesion led to very wide secondary extension. The cancerous disease was situated in the trigon, to the inner side of the orifice of the left ureter, and occupied an area less than an inch square. The mucous membrane was hyperæmic, but was not otherwise involved in the cancerous disease. The only urinary symptoms were frequent micturition and very slight hæmaturia.

The patient died of acute and widely disseminated cancerous disease, probably as a consequence of infection of the blood stream.

In the diagnosis of *renal disease*, the cystoscope is of value, clearing up the question of vesical complications and by discovering any special features indicative of lesions of the kidneys or of their ducts, as well as by enabling us to answer the following questions :—(1) Are both kidneys functionally active? (2) Is one kidney diseased, or are both involved? (3) If one alone is diseased, which is it?

By employing this method early in the course of the disease

most valuable time may be utilised, which would otherwise be wasted waiting for other evidences to prove the nature of the renal lesion. Too often, when we wait until the symptoms are sufficiently significant to form a basis for diagnosis, the disease has advanced beyond our power to remedy. In an examination with the cystoscope, the appearance of the orifices of the ureters, the character of the fluid which escapes, and the nature of the flow must be observed.

The appearance of the orifices of the ureters in health vary, not only in individual cases, but also according to the degree of distension of the bladder. In some, the orifice lies on a flat surface, there being almost no ridge to the trigon, and no elevation of the mucous membrane at the mouth of the ureter. In others, the edges are well marked and the ureteral opening is on the summit of a distinct mount. All gradations exist between these two extremes. In disease other aspects present themselves, changes in colour, in size, in shape, and in the appearance of the surrounding parts. Sometimes the mouths seem to be pushed out towards the lumen of the bladder, in others they seem to be drawn in. These conditions must be studied in the living subject, as after death the appearances lose most of their characteristic features.

In books upon physiology, the urine is said to trickle, drop by drop, into the bladder. This description is entirely wrong and misleading. In health, the urine collects slowly above the closed sphincters at the orifices of the ureters, and at intervals is thrown by squirts with considerable force into the bladder. The length of the intromissions depends upon the activity of the kidney. Under favourable circumstances, about 10 to 15 drops are ejected, alternately, from each ureter every 30 or 40 seconds. By carefully watching the line of the ureter, the portion coursing through the wall of the bladder, the part immediately above the sphincter, will be seen gradually to distend. Immediately before the urinary squirt appears, the expanded duct, looking, in form, not unlike a miniature engorged leech, is drawn slowly upwards and outwards. It gives a sudden wriggle, its muscular fibres contract, the sphincter is forced open, and the contents are ejected. The urine, as it is thrown into the bladder, forms a distinct jet which shoots downwards and inwards. The spurt occupies about two seconds. The form of the spout can be seen most

easily in cases of renal hæmaturia. The aspect of the orifices of the ureters individually, and in relation to each other, is important to observe. It may be stated as a general observation, that, when the appearance of the orifice of one ureter is altered while that of the other is normal, the renal lesion is on the side of the morbid ureter. And, again, if the number of urinary shoots be counted within a given time, as they occur from each side, and a marked difference is observed, the side on which most shoots are seen is either the site of considerable local irritation, or is the most active organ functionally. When due to morbid irritation, the shoots not only succeed one another rapidly, but they are of short duration, and the urine which escapes is small in quantity; whereas in increased functional activity, the shoots, in addition to being frequent, are prolonged, and the amount of the urine is large. Instead of coming in regular and distinct jets every 20 or 30 seconds, the force of the shoots may be diminished. The manner in which the urine enters the bladder may be so slow as to be hardly perceptible. In stricture of the ureter, or when its lumen is obstructed by a stone, the urine may dribble into the bladder, just as it dribbles out of it in enlarged prostate or in stricture of the urethra. In describing the orifices of the ureters (*see* Fig. II.) we may speak of the inner and outer lips and the upper and lower angles. In many cases the orifice of a ureter may not be visible, but it is not necessarily to be concluded that the orifice is absent or displaced. It may be merely hidden—at one examination easily seen, at another not to be found.

It is a well-recognised fact that the orifice may become displaced as the consequence of old inflammatory adhesions, but it may also be congenitally misplaced, as was well illustrated in a case I brought before the Society at a meeting on the 4th of November last.

The case was one of tuberculous cystitis in which I performed a suprapubic cystostomy. At the cystoscopic examination, prior to the operation, I saw a small grey object close to the union of the anterior and upper wall of the bladder and below it a rounded swelling of the mucous membrane, the nature of which I was unable to determine. At the operation I kept the incision into the bladder very low down

so as not to injure the swelling just mentioned. When the mucous membrane of the bladder was exposed, the swelling was discovered to be a ballooned ureter with a congenitally abnormal insertion into the bladder. At the orifice of the right ureter a L-shaped calculus was found impacted (Fig. X.). Such an abnormal insertion of the ureter is extremely rare, and quite unique in my experience.

In cystitis the appearance of the orifices depends upon the cause as well as upon the stage of the disease, upon whether the infection has been from above or from below. In recent and acute cases of ascending infection, the lips are greatly thickened, congested, and may even be ulcerated, and undue resistance is offered to the escape of urine (Figs. XIV. and XV.). As the disease advances, the mucous membrane becomes covered by small white masses of purulent deposit (Fig. XVI.) and the walls of the bladder are gradually infiltrated with connective tissue elements, while the muscular coat becomes hypertrophied. Together with these changes, the frequent and spasmodic contractions of the bladder and the resistance offered to the escape of urine from the ducts tend to cause protrusion of the ureteral orifices into the bladder and to diminish the area of the trigon. This gradual separation of the lips interferes with the valve action of the lower end of the ureter. The flow from the kidneys is in a slow and almost continuous stream, and the column of fluid, instead of being interrupted, is unbroken from the neck of the bladder upwards to the renal pelvis. The physiological barrier has been removed, and the door is open for infection of the ureters and kidneys, and an ascending septic ureteritis is established. The changes observed in septic ureteritis vary considerably, but, as a rule, they are such as I have just described. In addition, the lips may be deeply pigmented, so as to present a greyish slate colour, and the orifices may open into a large vesical sacculus. In a few instances the valvular action of the ureter may be maintained; while the bladder wall and the mucous membrane of the ureter present marked inflammatory changes the inter-parietal portion of the duct may be free from disease. In descending ureteritis, the ureter is inflamed secondary to the kidney, and the appearances in the bladder vary according to the nature of the renal lesion. In septic cases, the orifice is irritated, but

seldom dilated. The lips are deeply injected, of a mottled greyish-red colour, may be covered with muco-purulent discharge and ulcerated, while the shoots of urine are generally frequent, they are small in size, and contain pus. In cases of calculus impacted in the renal pelvis, or in the course of the ureter, the orifices show certain changes, which can be judged of best by contrasting its appearance with that of the opposite orifice.

Take another case, where the calculus I now show you was impacted in the left ureter two inches above the bladder. The patient had suffered from symptoms of impacted renal calculus for over ten years and had been repeatedly under treatment in the Royal Infirmary, but on every occasion refused to submit to operation, until compelled by the severity of the pain. On several occasions cystoscopic examinations were made, but at no time was blood seen to escape from the ureter—indeed, hæmaturia was observed only on two occasions and then only to a slight degree. The right ureter opening was strictly normal in appearance, while the left (Fig. XVII.) was greatly dilated, and the mucous membrane covering it was thickened, deeply congested, of a redish-purple colour, and the blood-vessel ramifying on the mucous membrane just above the orifice was deeply injected. The contrast between the right and left orifices was very marked.

Periureteritis is generally the result either of prolonged cystitis or severe pyelitis. As viewed externally, the walls of the ureter are greatly thickened and sclerosed, and tissue envelops the ureter like a thickened sheath. While the duct above the level of the bladder may be increased in bulk, the lumen of the ureter is diminished. Strictures are frequent and the ureter orifice is generally contracted to a pin-head opening. In old cases complete obstruction may result (Fig. XVIII.), but even in such cases, if the kidney be drained by a syphon, by slow degrees the lumen of the ureter may be restored sufficiently to allow the slow escape of urine into the bladder. Fig. XIX. is taken from an advanced case of pyonephrosis, in which nephrotomy had been performed, on account of the obstruction becoming complete. In this case the mucous membrane of the bladder was deeply injected, and the line of the left ureter was strikingly marked by two bright red parallel lines,

one on either side of the ridge of the trigon. The orifice of the ureter was almost closed, and was situated on a distinct prominence of the mucous membrane. From it no urine escaped. An examination made after the kidney had been drained for over four months showed small quantities of purulent urine trickling from the previously closed orifice. There were no distinct shoots, but the mouth of the ureter was distinctly larger than at the time of the operation.

In respect to the diagnosis of renal disease the following conclusions may be drawn:—(1) When one ureter orifice is altered, while the other is normal, the renal lesion is on the side of the morbid ureter. (2) When the urinary shoots are more frequent on one side than on the other: (*a*) greater functional activity is indicated by the shoots being uniform in size and regular in rhythm; (*b*) undue irritation of the kidney is to be inferred when the shoots, while more frequent than normal, are irregular in rhythm, unequal, and small in size; (*c*) stricture, stone, or chronic ureteritis should be suspected when the shoots are distorted in form or irregular in amount: (3) When the urine does not escape in distinct jets; (*a*) dilatation of the ureter without paralysis of the sphincter is indicated when the urine dribbles into the bladder at intervals; (*b*) destruction of the sphincter action is shown by the urine flowing into the bladder almost continually. (4) The character of the morbid fluids escaping from the ureter, or of clots, &c., occupying the opening, denotes the morbid changes taking place in the corresponding kidney. (5) The deformity of the orifice also indicates the character of the renal disease: (*a*) pin-head contraction (chronic inflammation or impacted calculus; (*b*) elongated and distorted (distension of renal pelvis or infected nephritis); (*c*) swollen or pouting (prolonged but not acute inflammation of renal parenchyma); (*d*) dilated (advanced tuberculous or calculous pyonephrosis; (*e*) U-shaped (significance doubtful—usually denotes prolonged irritation of renal pelvis).

THE EFFECT OF TOBACCO IN HEALTH AND DISEASE.

(a.)—ON THE HEART AND CIRCULATION.

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THE active principle of tobacco is nicotine, which has a very powerful influence upon the blood pressure and cardiac action. Both in frogs and mammals nicotine produces, first, convulsions and then paralysis. When applied in small doses to the frog's heart it causes the beats at first to become slow and afterwards to become quick. If the dose be large, no primary slowing may be observed. In animals it causes slowing of the heart with enormous rise of blood pressure. The rise of blood pressure is so great that I have never seen it equalled after the injection of any drug, with the exception of suprarenal extract. The rise of pressure is chiefly due to contraction of the arterioles. This contraction is partly dependent upon stimulation of the vaso-motor centre in the medulla oblongata, but partly also to a local action upon the arterioles themselves, as it is produced by injection of the drug even after the medulla has been destroyed. The pulse rate in mammals is first slowed and afterwards quickened, just as in the frog. The slowing is due partly to stimulation of the vagus centre in the medulla oblongata, and partly to the stimulation of the inhibitory ganglia in the heart itself. The subsequent increase in the pulse rate is due to paralysis of these ganglia. In consequence of this double action of nicotine, when the vagus is divided during the period of slow pulse, the pulse becomes somewhat quicker, but still remains slower than normal. When, however, the dose has been sufficiently large to quicken the pulse, no stimulation of the vagus will slow the heart, as the inhibitory ganglia in the heart, through which the vagus acts, are paralysed by the nicotine. This action is the same in the heart of the frog, so

that, after a large dose of nicotine, stimulation of the vagus has no effect upon the heart, but stimulation of the venous sinus itself will slow the heart. The reason of this is, that although the inhibitory ganglia in the heart are paralysed, the inhibitory neurons, which proceed from them, are still intact and are affected by local stimulation.

Formerly, tobacco enemata were used as a means of causing vascular and general relaxation, but they were far from being without danger, and are never employed now. But, although tobacco is not used as a remedy for disease, its employment is so universal that its action requires very careful consideration. Nicotine alone is only taken into the body when tobacco is used by chewing or by snuffing. When it is chewed most of the juice is expectorated, but a small portion is probably swallowed. When tobacco is used in the form of snuff small quantities of it find their way into the naso-pharynx and they are swallowed. The tobacco used for chewing or snuffing contains, as a rule, but very little nicotine, and so symptoms of poisoning from either of those habits are rare. Usually, however, tobacco is employed for smoking either in the form of cigars or cigarettes, or in a pipe. When used in any one of these forms it is not pure nicotine which reaches the mouth, but really the products of the dry distillation of tobacco, containing a large quantity of pyridine and picoline bases. Probably nicotine in greater or less quantity may be present. The proportions of the pyridine and picoline bases in the smoke vary according to the mode in which tobacco is burnt. In a cigar there is freer access of air, so that much collidine and little pyridine are formed, while in a pipe much more pyridine is produced and thus stronger tobacco can be smoked in a cigar than in a pipe. So much is this the case that tobacco which, in the form of a cigar would produce no disagreeable effect, may cause giddiness and vomiting if smoked in a pipe. The smoke from a pipe or cigar usually passes simply into the mouth and out again either through the mouth or the nostrils, but when smoked in a huqa or narghileh the smoke is inhaled into the lungs, and this is frequently done also by people who smoke cigarettes. When a huqa or a narghileh is used the smoke passes through water before being inhaled, and it is thus deprived of most

of its poisonous constituents, but this is not so with the smoke of cigarettes, and, as absorption occurs very rapidly from the pulmonary mucous membrane, cigarette smoking is sometimes very injurious. There is another reason, however, why cigarette smoking is frequently more harmful than smoking a pipe or cigar, and it is that cigarettes are small and can be smoked in a few minutes, so that many more are consumed in the course of the day than would correspond to pipes or cigars, and the total quantity of tobacco used is thus greater in the form of cigarettes.

Smoking, in moderation, does not seem to be injurious to grown-up people, but there appears to be a general consensus of opinion that it is very distinctly harmful to growing lads. In adults, smoking appears to have a double action. It will stimulate the brain to increased activity and it will also produce a soothing effect in conditions of excitement. Its stimulating effect upon mental activity is probably partly due to the local irritant action of smoke upon the mouth causing reflex dilatation of the vessels which supply the brain. Its action as a sedative is probably partly due to the necessity of breathing rhythmically while smoking, and to the soothing effect of watching the smoke as it issues from the lips or nostrils, especially when it is blown out in the form of rings. This is by no means an unimportant factor, for many people derive but very little pleasure from smoking in the dark.

One of the commonest results of excessive smoking is chronic pharyngitis, with irritability of the throat, cough, and hoarseness, and sometimes the irritation also affects the tongue. Weakness of vision, nervous tremor, and giddiness are frequently the result of tobacco smoking. It is difficult to decide how far these are due to the direct action of the tobacco smoke upon the nervous system and how far they are caused through alteration in the circulation. The circulation becomes much affected, palpitation and pain in the cardiac region are common results. Sometimes, though rarely, the cardiac pain may be so great as to simulate angina pectoris. Irregularity of the heart is very common, and it appears to me that this irregularity is more frequently found from a common kind of tobacco known as "pigtail" than from better class tobaccos. When I was a house physician, I met with it very

frequently, and the cardiac rhythm might be represented in this way || || || | | || | | | , a pause followed by one or two heavy beats, then a succession of quick and small beats, and then a pause again. With better class tobaccos I have not observed this irregularity so frequently, but I have more often seen the patient simply fall down unconscious as if he had been shot. These unpleasant symptoms, as well as the nervous symptoms which accompany them, may sometimes cease upon lessening the amount of tobacco used, but not unfrequently a very small quantity appears to keep up the condition after it has once been established, and complete abstinence from tobacco, occasionally for a period of several months, is required before it can be resumed without causing a recurrence of the symptoms.

(b.)—ON THE GASTRO-INTESTINAL TRACT.

By NORMAN DALTON, M.D. (LOND.), F.R.C.P.,

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It is well known that smoking increases the salivary secretion, and I believe that many habitual smokers, who do not expectorate, nevertheless secrete and unconsciously swallow a considerable quantity of saliva. Which of the products of the combustion of tobacco are contained in this saliva is doubtful, but it is agreed that the poison which causes the constitutional effects of the drug can be absorbed from the stomach, though not so readily as from the lungs. Probably there is little or no nicotine present, for it is an acrid oil which should produce gastritis, and yet smokers, unlike drunkards, do not suffer from chronic gastric catarrh. The vomiting of acute tobacco poisoning is, of course, a sign of nervous depression rather than of any specific action of the drug on the stomach, for it occurs when tobacco is introduced into the rectum. We do not know whether smoking affects the secretion of the gastric juice (apart from the action of the saliva which is swallowed) or of the bile or pancreatic juice. Cersoy (*Bullet. Gén. de Thérapeut.*, Paris, 1888, CXIV. 466), however, states that tobacco diminishes the secretions through its action on the nerves which supply the glands.

As regards the muscle of the alimentary canal it is natural to suppose that its power, like that of the heart muscle, would be impaired by the action of tobacco on its nervous supply ; and Cersoy (*op. cit.*) says definitely that tobacco, by paralysing the vagus, diminishes the movements of the stomach and brings about all the consequences of motor insufficiency of that viscus, such as retention and fermentation of the food, and, later on, gastrectasis.

In endeavouring to determine how far tobacco is responsible for gastro-intestinal affections, it is difficult to exclude other causes. Consequently great reserve should be shown in drawing conclusions. Mendelson's investigations on the adult students of certain colleges in St. Petersburg showed that 10·69 per cent. of smokers and 9·92 per cent. of non-smokers fell ill of affections of the digestive organs. The difference is too small to be of value. As regards the stomach, I agree with Dr. Clifford Allbutt in thinking that smoking produces in certain persons a hyperchlorhydria, evidenced by an intense heartburn, which is relieved by food. In my own experience this condition occurs upon smoking when the stomach is empty, and I believe that it is due to the fact that the saliva, which is swallowed, excites a secretion of HCl at a time when there is no food in the stomach for the acid to act upon. But indigestion may also occur from smoking after meals ; for the continuance of the secretion of saliva and its arrival in the stomach after the period of amylolytic digestion is over must tend to neutralise the acid and arrest the action of the gastric juice. In this case fermentation would occur and the patient would suffer from epigastric discomfort, flatulence, &c.

In the *Gaz. d'Hôp.*, Paris, 1877, i. 545, Révillont describes two cases of gastralgia which he believes were caused by tobacco. Both the patients were middle-aged men. One suffered for a year from urgent vomiting and severe epigastric pain with almost complete indigestion of food. He became extremely emaciated, but took no remedies and continued smoking until he was too weak to do so. Shortly after he ceased smoking the attacks stopped suddenly. This man had four subsequent attacks in which the gastralgia and vomiting recurred daily for a considerable period. Each attack was preceded by excessive smoking, and ceased when the use of

tobacco was discontinued. The other case was characterised by indigestion, severe epigastric pain, and emaciation. No cause could be found, but when the patient reduced his consumption of tobacco from 13 cigars a day to 2, the symptoms disappeared. In the following year his consumption of tobacco again became excessive, and the gastric affections recurred, but ceased on his return to moderation in smoking. Both these cases suggest a gastralgia of nervous origin, but the disturbance of the gastric nerve supply may have been due to tobacco.

That tobacco may indirectly occasion gastric symptoms is shown by a case of vomiting, about which I was recently consulted, and the cause of which proved to be a pharyngitis sicca, set up by the immoderate smoking of cigarettes.

We know little about the influence of tobacco on the intestines. It is agreed that patients with diarrhoea should not smoke, and in all intestinal affections of obscure origin an enquiry into the habits of the patient as regards tobacco should be made. There is a popular idea among men that the morning smoke enables them to obtain a regular evacuation of the bowels. The sequence of events is probably the result of habit; for, if tobacco checks the secretions and lessens the motility of the bowels, it should produce constipation. Still, if smoking were pushed so far as to produce a definite nervous depression, irregular movements of the intestines would occur, as in acute tobacco poisoning, and these might result in the passage of a motion.

With our present knowledge tobacco should never be used as a remedy. Even as an enema it has frequently proved fatal.

(c.)—ON THE NERVOUS SYSTEM.

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It must be recognised that certain nervous systems are peculiarly susceptible to the influence of tobacco, and that the symptoms evoked in certain persons by even moderate indulgence in that poison are of a most severe and even alarming character. On the other hand certain nervous

systems seem to be peculiarly tolerant of tobacco, so that the possessors of them are able to indulge in large quantities without any apparent bad effect and without any impairment of their working efficiency. It may be asked, "How do we know that such men would not be able to work much better without tobacco?" Of course it is not possible to say that they would not; but we know that there are men of great physical and intellectual activity who do use immense quantities of tobacco and do much work of an exceedingly good quality. Such men assert—and although a certain degree of prejudice naturally attaches to their evidence, it must be allowed some weight—that they have tried and they cannot work so well or so comfortably without tobacco, or even with a moderate quantity of it, as they can with their usual excessive allowance. And it must be confessed that in such cases, what we call the over-indulgence may be continued during many years without producing any apparent bad effects, either physical or mental.

These two classes must be regarded as exceptional. We know that certain persons are peculiarly susceptible to the influence of other drugs in an analogous way. Thus belladonna even in small doses is distinctly poisonous to certain individuals. Certain others are peculiarly tolerant of the drug. It has been suggested that in the latter class certain parts of the higher levels of the nervous mechanism of the heart are not so highly developed or specialised as usual—that, in short, in reference to the part of the nervous system acted on by belladonna they remain in the condition of the child, who, as we know, is much less susceptible to the action of belladonna than is the adult. An analogous condition may be present in persons peculiarly susceptible to tobacco. We know that to the child tobacco is highly poisonous and harmful, and the adults, who have the peculiar susceptibility to tobacco alluded to, may have the part of the nervous system influenced by the poison, still in the sensitive and susceptible condition in which it is in childhood.

With regard to the effect of tobacco in so far as it gives rise to symptoms of nervous disturbance—and the effect on the optic nerve is excluded—they are of several kinds.

1. Tremor is one of the commonest. It is fine and

rhythmical, it is not constant, but if once established it tends to go on and so become more and more definite and persistent. It may be got rid of entirely by leaving off the tobacco.

2. Giddiness is also a common effect of excessive tobacco smoking. It is probably the result of disturbance of the vagus, and although in the habitual smoker it is unassociated with nausea, it is probably to be referred to the same cause as the giddiness so invariably associated with nausea and even vomiting in the novice.

3. The vaso-motor effects produced by tobacco are curious. Coldness of the extremities, even blueness of those is frequent. Associated with this there is occasionally some pallor of the face, and very frequently some excessive sweating of the forehead. This also is reminiscent of the effect of the nausea of tobacco smoking in the beginner.

4. Sleeplessness is one of the most troublesome effects of excessive tobacco smoking. This sleeplessness is of a curious character, and is properly described as "intra-nocturnal insomnia." The sufferer goes to bed, and goes to sleep at once. He wakes up at 2, or 3, or 4, as the case may be, and then for an hour or more he is very widely awake, dropping then into a troubled sleep, and waking tired and unrefreshed.

Such are the common effects of tobacco in excess. The question what is excess is a very difficult one, and one which experience must decide for the individual. In regard to cigarette, cigar, or pipe, the cigarette is undoubtedly most harmful because of its convenience. It is so easy to light a cigarette, and there are so many opportunities for indulgence. It is not so easy to smoke a pipe or cigar, so that the cigarette smoker has a much greater temptation to over-indulgence in tobacco than either the cigar or pipe smoker. And there is little doubt that the use, especially if the use is an excessive one, of alcohol much intensifies all the deleterious effects of tobacco.

(d.)—ON THE MOUTH AND TONGUE.

By WALTER G. SPENCER, M.S., M.B., F.R.C.S.,
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[With Plate V.]

A PECULIAR susceptibility to the influence of tobacco is shown when a lesion arises in previously healthy epithelium, and this may even induce cancer at a specially early age. Susceptibility plays an important part when some chance sore, caused by biting the tongue or cheek, or by the irritation of a tooth, or by a syphilitic inflammation, is aggravated by tobacco. The influence of tobacco is more doubtful in the cases of late secondary or tertiary syphilitic ulceration, or of prolonged dental irritation, for such affections may persist, and ultimately become cancerous without any aid from tobacco.

Tobacco affects susceptible people, whether it is smoked through a pipe or in the form of cigars or cigarettes, and also when chewed. As to the last, the limited prevalence of the habit prevents instances from being otherwise than rare in this country. But in India cancer is often seen in both men and women from chewing tobacco mixed with betel. On the other hand, snuff does not give rise to irritation; in spite of the universal use of snuff in the 18th century, no mention is made of any ill-results to the nose.

I am greatly indebted to my colleague, Dr. H. Wilson Hake, F.C.S., who has lent me his MS. of an interesting lecture on the Composition of Tobacco, to which he has added some valuable notes. When tobacco undergoes combustion the greater part of the nicotine is converted into pyridine and its compounds, but not all the nicotine so disappears, for as much as one-seventh of the original amount has been recovered from the smoke. In pipe smoke pyridine is the chief constituent, in cigar smoke trimethyl pyridine or collidin. As regards the chewing of tobacco it is to be noted that nicotine is, to a certain extent, decomposed with the formation of pyridine by the action of warm caustic potash, and it is therefore possible that pyridine may be formed in the mouth by the action of the saliva. Pyridine is a base, and may combine with fatty acids or with alkaline salts, such as potassium carbonate. The harmless character of snuff may be due to the small percentage of



PLATE V.

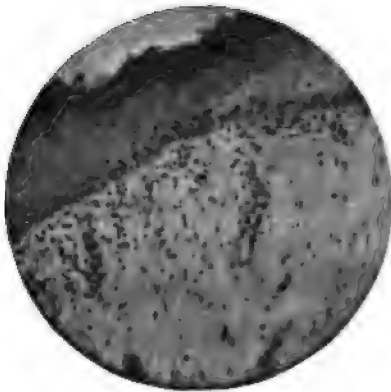


Fig. 1. (Microphotograph.) *Vertical section through a smooth patch.*



Fig. 2. (Microphotograph.) *Vertical section through a raised whitish patch.*



Fig. 3. (Microphotograph.) *Vertical section through a warty patch.*

nicotine, the relative absence of pyridine, the greater length of time allowed for fermentation, or the larger addition of alkaline salts. This may serve as a guide when distinguishing different kinds of tobacco in which the percentage of nicotine is variable, as is that of alcohol in wine, varying from 6 to 8 per cent. in Virginian tobacco to 2 per cent. in Havana tobacco or snuff. With the irritation produced by tobacco may be compared that arising in connection with the combustion of other materials. Coal-soot contains an irritant not present in coal dust, and this may be pyridine derived from the bituminous portion of coal. Workers in gas tar, paraffin, and carbolic acid manufactories suffer from similar irritation, which may develop into cancer.

The influence of tobacco upon the mucous membrane of the mouth and tongue appears clinically as (1) an excoriation—an area becomes painful or the corneous layers of the epidermis are raised, then detached, leaving a raw surface with red papillæ; (2) a superficial glossitis causes the papillæ to disappear, leaving a patch of thin glazed epidermis over inflammatory tissue, *see* Fig. 1; (3) the chronic glossitis causes a marked thickening of the superficial layers of the epidermis so as to produce a whitish raised patch, comparable to the epidermis of the palm. To this various names, such as leuko-keratosis, leukoplakia, psoriasis, have been attached, *see* Fig. 2; (4) a warty or horny patch of heaped-up epidermis, the papillæ are markedly-elongated upwards, and the interpapillary processes of epithelium project downwards, *see* Fig. 3. These changes in the epidermis are accompanied by a collection of small round cells beneath the epithelium, which produces clinically a slight degree of induration. But well-marked induration of the base of the patch, or the commencement of ulceration, indicates the development of epithelioma, and this is almost certain to quickly follow the formation of the horny or warty patch. Such patches are seen especially upon the dorsum of the tongue and the buccal aspect of cheeks. Besides this an indurated fissure or raised patch is started on the lips, especially by smoking a clay pipe, in which the heat of the pipe seems to increase the effect of the tobacco. Also in the mouth the end of a clay pipe is particularly likely to determine an epitheliomatous ulcer. Whilst some of the lesions are recognised early, the starting of an epithelioma about the

frænum linguæ, or in the folds of the floor of the mouth, or in the buccal pouches, or at the bottom of an old-standing syphilitic furrow is likely to pass unnoticed for some time. Hence these regions require to be most fully inspected. On the other hand the gravity of the affection is often exaggerated when there is irritation about the lingual tonsil or the circumvallate papillæ, or just in front of the anterior pillar of the fauces where the papillæ, called in the rabbit the foliate papillæ, are in some people well marked. Such irritations are noted early and receive much attention, but are rarely important if the patient leaves off smoking, always provided that no officious person applies the cautery or caustics.

Having identified tobacco as the cause of the irritation, smoking must be put a stop to absolutely ; only some months, after a rapid and entire disappearance of the affection, can the resumption of smoking be sanctioned, and then but tentatively. Ten days after the cessation of smoking, along with attention to the teeth and dentures, and the active treatment of syphilitic lesions, there should be marked improvement, pointing to the early disappearance of the affection. In spite of all that has been said against it, caustics and the cautery are still applied, although no reason can be given for this evil custom, and epitheliomatous degeneration is frequently a direct consequence. Beyond alkaline mouth washes, *Lotio nigra*, unguentum hydrargyri, or bichromate of potash, 5 to 10 per cent., nothing more irritating should ever be used.

The excision of the affected patch, followed by suture, as first recommended by Mr. Butlin, is to be undertaken in all cases, unless after ten days of treatment there is such improvement as to indicate an early disappearance of the affection. It is the one way of preventing cancer.

(e.)—ON THE UPPER AIR PASSAGES.

By H. LAMBERT LACK, M.D. (LOND.), F.R.C.S. (ENG.),
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SINCE undertaking this article I have made a fairly extensive literary search, and have been struck with the small amount that has been written on the subject. The use of tobacco is

often included amongst the causes of throat affections but without comment, and apparently without much significance being attached to it. Considering the frequency of the habit and the existence of anti-tobacco leagues, it may be assumed that, if smoking produced any characteristic or well-defined effect upon the upper air passages, the fact would have attracted attention.

Tobacco may affect the upper air passages either directly by acting as an irritant upon the parts with which the smoke actually comes in contact, or indirectly by causing dyspepsia or general constitutional disturbances. A few opinions may be quoted. Morell Mackenzie considered smoking a contributory cause of "relaxed" sore throat. He states, however, that this affection is far more often due to dyspepsia and alcoholism. With the last statement I entirely agree, and it is probable that tobacco acts by causing dyspepsia and not directly. Mackenzie states there is no evidence to show that smoking produces chronic granular pharyngitis.

Lennox Browne enumerates smoking amongst the causes of chronic laryngitis and pharyngitis, and believes that its effect is greater than is generally admitted. He states that smoking causes a characteristic dryness of the pharynx, persistent desire to clear the throat, and a steady deterioration of the voice, which becomes veiled and toneless. He thinks the effects of tobacco may be partly due to the bad habit some smokers have of constantly expectorating. He quotes Ramon de la Sota of Seville, where excessive smoking is apparently common. The latter describes three conditions as due to tobacco: a simple erythema of the pharynx; an acute vesicular pharyngitis which occurs only in those who smoke very strong tobacco and in those who chew; and a chronic granular pharyngitis occurring in inveterate smokers, and in those employed in the manufacture of tobacco.

Moritz Schmidt places the use of tobacco amongst the most frequent causes of affections of the throat, and considers this is the reason that men are more subject to these complaints than women.

In spite of these views, my own experience, corroborated by careful enquiry amongst a large number of singers and other professional voice-users, leads me to believe that the

results of tobacco smoke on the throat are greatly exaggerated. Many singers with first-rate voices state that smoking has little or no effect upon their throats. Mario, the great tenor, smoked and inhaled cigarettes constantly. I think it would be safe to state that moderate smoking never originates any affection of the throat worthy of the name. At the most it causes a slight hyperæmia of the parts with which the smoke comes in contact, or an insignificant catarrh.

In the great majority of affections of the upper air passages which are ascribed to smoking, careful investigation will show that other and more potent causes are at work and that tobacco plays a minor part. Post-nasal catarrhs, which are so commonly ascribed to excessive smoking, will be found much more often to depend upon some definite affections of the nose, upon chronic dyspepsia, alcoholism, &c. In a patient at present under my care a long existing post-nasal catarrh ascribed to cigarette smoking has been found to depend upon a sinus suppuration. An apparent justification for blaming the tobacco arose from the fact that the catarrh greatly diminished when smoking was stopped. In like manner a chronic pharyngitis, a rawness or burning feeling in the pharynx, a little irritable cough or slight huskiness of the voice ascribed to smoking will more often be found to depend upon alcoholism or dyspepsia. The so-called "relaxed" or "gouty" throats, especially in old people, are far more often due to champagne than to cigars. There is no sufficient evidence to prove that malignant disease of the throat is due in any way to smoking.

Yet the influence of tobacco cannot be denied altogether. Undue indulgence in strong tobaccos may be a contributory cause of dyspepsia and thus react on the throat. Also excessive cigarette smoking, especially when the smoke is inhaled, and perhaps, one may add, when associated with excessive expectoration, is liable to cause a pharyngeal catarrh, more particularly in young people.

When there is disease in the upper air passages the effect of excessive smoking is often manifested by a marked increase of the trouble. In suppuration in the accessory sinuses of the nose, any excess in the use of tobacco greatly aggravates the patient's symptoms, a fact insisted on by Hajek and others. Nasal, pharyngeal and laryngeal catarrhs are likewise made worse, still

it is doubtful if tobacco smoke has much more effect upon this condition than any other impure atmosphere. Lennox Browne, Morell Mackenzie, and Moritz Schmidt all agree that smoking in a closed room is much more harmful than in the open air, and that breathing a smoke-laden atmosphere is almost as bad as actually smoking.

All forms of tobacco are not equally harmful. Numerous enquiries amongst patients have led me to lay down the following propositions:—(1) Cigarette smoking is the most pernicious; and cigarettes vary, Egyptians being the worse. Some kinds of Turkish cigarettes are nearly as bad; Russians and Americans are less harmful. (2) Cigars are the least pernicious form of smoking so far as the throat is concerned, and pipes occupy an intermediate position. (3) Other things being equal, the more excessive the smoking, the more the smoke is inhaled, and the younger the patient, the more likely are ill-effects to be seen. (4) The ill-effects of smoking are greatly exaggerated by indulgence in alcohol; much of the mischief produced by the latter is often erroneously ascribed to tobacco.

The mildly stimulating effect of tobacco smoke upon the upper air passages may sometimes be apparently beneficial. Patients suffering from a dry post-nasal catarrh or tracheitis find great relief from an early morning cigarette. The irritation of the smoke probably excites a little hyperæmia and secretion, and enables the patient to expectorate more freely and clear the air passages. It is doubtful if harm can be ascribed to this. On the other hand, excessive cigarette smoking, especially if the smoke be inhaled, would be likely to aggravate the trouble. Also, when these dry catarrhs are associated with an irritable pharynx, smoking or inhaling a smoky atmosphere is apt to set up a violent paroxysm of cough.

To sum up, from what has already been said it will be seen that tobacco exerts a mild stimulating effect upon those parts of the upper air passages with which the smoke directly comes in contact. When the air passages are otherwise healthy, these effects are slight or unnoticeable, and no harm results unless the patient is of tender years and smokes or inhales cigarettes excessively. When any catarrhal affection of the upper air passages is present, smoking should be

forbidden, or at any rate limited strictly. The ill-effects of tobacco on the throat and nose are chiefly an indirect result, due to the dyspepsia or systemic poisoning induced by smoking.

(f.)—ON THE EYES.

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It may be said that tobacco affects the eye in two distinct ways. (1) Dense tobacco smoke will cause a *catarrhal conjunctivitis* in those persons who suffer from irritable eyes, especially if the eyes are exposed to it in the foul atmosphere of a badly ventilated room. (2) Nicotine, slowly and continuously absorbed from the alimentary canal, is liable to produce *tobacco amblyopia* or *amblyopia nicotinic*.

There are two clinical types of tobacco amblyopia. The *acute* form, which has been occasionally observed when blindness has arisen suddenly after the application of tobacco to a hollow tooth. The *chronic* form which is the more usual, since it occurs chiefly in males over 30 years of age, but very rarely in females. Those who suffer from the disease have been heavy smokers of strong tobaccos, such as shag, cavendish, or strong cigars; the amount consumed varying from a half to three-quarters of an ounce per diem for 10 or 15 years. Chewing tobacco may also cause the condition, while Jessop mentions a case which occurred in a non-smoker who took snuff for a cold for ten days only. It has been observed also in those who work in tobacco factories although they were non-smokers. Tobacco amblyopia is more liable to occur in those persons who are heavy smokers, and are addicted to alcohol, than in those who are abstainers from it. There is no doubt that poverty, underfeeding, overwork, worry, or bad sleeping predisposes to the condition, by lowering the resistance of the nervous system to such toxic influences. Smoking late into the night and at night, smoking on an empty stomach, inhaling smoke, and chronic dyspepsia also predispose the patient to the condition. Others from their peculiar temperament may be specially liable to the disease. The onset is

insidious, associated with loss of appetite, insomnia, and frontal headache. There is a progressive loss of vision in both eyes, and the patient complains that he sees things indistinctly as in a grey fog. Colour vision is affected, so that gold and silver coins are often mistaken one for the other. The distance vision varies from $\frac{6}{\text{nil}}$ to $\frac{6}{24}$ on Snellen's test types, and near vision is rarely better than No. 6 or No. 4 on Jaeger's types. Improvement of sight is sometimes secured by diminishing the light. This may easily be done by the use of dark glasses.

As a rule the pupils are equal and react fairly well to light. If the fields of vision be taken, it will be found that the central vision is defective though the peripheral vision may remain good. The patient often says that he sees better in twilight, when the pupil is naturally somewhat dilated. The fields of vision for white are quite normal in early cases, there are, however, absolute central scotomata later, and these correspond with that part of the retina which lies between the macula lutea and the blind spot. Central vision for green is affected first, for red later, and for blue last. These scotomata are, as a rule, situated within the twenty degree circle of the perimeter chart. They are oval in shape, having the long axis horizontal, and they encroach more upon the temporal half of the field than on the nasal side. In advanced cases, there is contraction in the peripheral field for white, and this condition suggests commencing optic nerve atrophy. The gravity of the central scotomata for red and green can hardly be over-estimated in engine drivers, railway guards and sailors. On ophthalmoscopic examination in early cases no change is observed in the fundus oculi; later the optic disc is usually hyperæmic, and retinal veins are somewhat engorged. In advanced cases, the optic disc is found to be somewhat pale, especially upon the temporal half of the disc, thus indicating the onset of primary optic nerve atrophy. The pathology of tobacco amblyopia is not definitely known. Some ophthalmologists look upon the condition as a chronic retrobulbar-neuritis, chiefly involving the axial fibres of the optic nerve, that is the papillo-macular bundle of nerve fibres which are connected with the ganglion cells in the neighbourhood of the macula lutea. Others suggest that the condition is an inter-

stitial neuritis, locating the lesion in the small amount of nerve connective tissue which exists in the optic nerve. Another theory is that the nicotine poisons the nerve cells in the brain which are connected especially with the papillo-macular fibres. When nicotine is injected into the nervous system of an animal, or is painted over nerve ganglia, it has first an excitatory action, amongst other things, causing a rise of blood pressure ; this is soon followed by the opposite effect, and the blood pressure falls. Medullated nerve fibres resist the effect of the nicotine for a considerable time, but naked ganglion cells and their synapses do not ; the ganglion cells become paralysed. It may be supposed then that the nicotine, circulating in the blood stream of heavy smokers, or chewers, especially in those whose power of resistance to such poisons is lowered by ill-health, overwork, or worry, acts upon the synapses between the retinal ganglion cells and the rod and cone bipolars. These synapses take place in the inner molecular layer of the retina, and at the same time the retinal ganglion cells themselves become poisoned and paralysed.

It is not easy to see why the papillo-macular region of the retina should be particularly affected, but it may be that those portions, which are more highly developed and the last to have been evolved, are the earliest to give out when any degenerative process sets in. This is especially the case when highly specialised cells are concerned, for surely colour sensations (*i.e.*, colour vision) have been developed subsequently to those primitive sensations of brightness commonly known as white, grey, and black.

Nicotine, however, causes vaso-constriction of blood vessels, and it has been suggested that the vasomotor ganglion cells are more resistant than the retinal ganglion cells, so that the blood vessels in the retina may be somewhat constricted and so interfere with the nutrition of the innermost layers of the retina itself. If this were so, one would expect to find the early degenerative changes in the retina in its more peripheral portions, as these are farthest from nutrition ; but we have already noted that the chief changes, as shown by the perimeter, occur in the region of the centre of the retina. Moreover, there are no definite ophthalmoscopic signs of vaso-constriction of the retinal vessels. The pathology of tobacco

amblyopia may be looked upon, then, as a primary degeneration of the ganglion cells in the neighbourhood of the macula lutea, with a secondary degeneration of the nerve fibres arising from these cells, and involving the papillo-macular bundle, and that the interstitial changes noted are the accompaniment of the degenerative process in the optic nerve itself.

In treating tobacco amblyopia, it is essential that tobacco should be absolutely given up, and the use of spirits reduced to a minimum ; these being only taken at meal time. Nutrition should be increased and the patient well fed ; plenty of exercise should be taken, and the blood should be frequently flushed with mild diuretics ; the skin should be kept active by diaphoretics such as pilocarpine ; the bowels should be kept free. These three processes materially aid the elimination of the toxic agent or agents.

If the patient is unable to sleep well at night, mild hypnotics may be ordered. Strychnine may be given by the mouth, combined with dilute phosphoric acid, or the liquor strychninæ hydrochloridi may be given hypodermically. If given by the mouth, it is usual to commence with liquor strychninæ hydrochloridi three minims, three times daily, and this must be increased so that, by the end of a month, the patient may be taking six or eight minims three times a day ; in other words, strychnine must be given in increasing doses. Fuchs recommends the administration of potassium iodide ; others recommend preparations of mercury.

If the cases are recognised early, and treatment is commenced at once and properly continued, recovery may be complete. This, as a rule, takes from three to six months or longer. If there are absolute central scotomata, complete recovery is quite impossible. The prognosis is better in younger men than in those over fifty years of age, for younger men will, as a rule, more readily acquiesce in the prescribed treatment.



ILLUSTRATIONS OF THE IMPORTANCE OF RECTAL EXAMINATION IN CHILDREN.

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THOUGH it is nearly ten years since Dr. George Carpenter, in Pediatrics, pointed out the great value of rectal examination in the diagnosis of certain diseases of children, this method of examination is but rarely carried out, except perhaps by those physicians who study especially this branch of medicine. The importance of this method of examination in a large number of abdominal diseases in infants and children cannot be over-estimated, and the ease with which it can be carried out is much greater than can be imagined by those who do not habitually practise it. The looseness of attachments of the rectum and sigmoid flexure in the young child makes it easy to explore the greater part of the abdominal cavity, so that in infants at any rate the kidneys and the under-surface of the liver can be palpated, and any tumour or thickening made out by the examining finger. If slowly introduced, the well-lubricated finger causes in most cases but little discomfort, and chloroform is rarely necessary, except in the case of inflammatory diseases of the pelvis, when tenderness is naturally present, and an anæsthetic is called for.

In some cases of chronic diarrhoea, which do not yield to treatment, or in cases of bleeding from the anus, the examination of the rectum will show the existence of a polypus or of some foreign body, the irritation of which has caused the symptoms. In cases of intussusception it is well known that the intussusceptum advances along the colon, and is often to be felt by the finger in the rectum; it may, however, often be felt in an early stage by the examining finger. For example, a case occurred at the London Temperance Hospital in a female child aged 4 months, which on December 26, 1903, suddenly began to vomit and to pass bright blood and mucus per rectum; this continuing, she was brought to the hospital two days later. On abdominal examination under chloroform, I

was unable to make out anything abnormal, but on passing the right index-finger into the bowel, I felt a sausage-shaped lump on the left side of the abdomen, which could be palpated with moderate distinctness; this, as the abdominal section subsequently showed, was an intussusception. In this case the symptoms were very suggestive, but there are many cases of intussusception in which they are very obscure, and a rectal examination may be of the greatest assistance.

Of recent years many cases of diseases of the female generative organs have been described, and many operations have been described for the removal of ovarian cysts in children. It has been also shown that cases of vulval discharges are frequently gonorrhoeal in origin, and in such cases the inflammation may extend upwards to the Fallopian tubes and ovaries, causing pyosalpinx, ovaritis, and pelvic peritonitis.

A case in which this happened was described by Dr. George Carpenter in the *British Journal of Children's Diseases*, the diagnosis of involvement of the pelvic organs being made by bimanual rectal examination. The Fallopian tubes and ovaries were found to be enlarged, and on one side considerably distended, probably with pus. This patient, as is no doubt often the case, recovered without operative treatment. Dr. Carpenter remarks that there is now a large number of cases of localised gonorrhoeal peritonitis in little girls on record, but that bimanual examinations of the internal genitalia are commonly omitted, and as many cases tend to spontaneous recovery, the disease of the uterine appendages is often passed by.

It is important that, in cases of gonorrhoeal vulval discharges, the condition of the pelvic organs be examined, in order that a further extension of the mischief be prevented, if possible.

A rectal examination in cases of disease of the appendix is now recognised to be imperative, as an abscess, of which there is no indication in the abdomen, may be easily felt by rectal examination.

Enlargement of the lymphatic glands in the hollow of the sacrum is sometimes an indication of disease which can be gained only by the same method.

In cases of tuberculous peritonitis, the local matting of the bowel and collections of pus may be easily felt, and

the enlargement of mesenteric glands made out; in cases of difficulty the diagnosis may be best made in this way, and the stage and progress of the disease noted.

Recently a child aged 2 years was admitted under my care in the London Temperance Hospital for severe constipation, which had been gradually increasing for several weeks, and during the last fortnight the abdomen had been noticed to be distended, and the child had occasionally vomited. On admission the child was noticed to be thin and the abdomen greatly distended, especially on the left side, where in the iliac and lumbar regions peristaltic movements were to be seen, and the distended bowel could be felt by the hand. The abdomen was not tender, and was resonant on percussion. A transverse ridge could be felt across the abdomen, just above the umbilicus, but no other masses were made out. There were no abnormal physical signs in the chest. The temperature was 100° F. on admission, but soon fell and remained below normal, fluctuating between 96.4° F. and 98.4° F. daily.

An enema brought away large faecal masses, containing much undigested matter, after which the bowel was emptied by purgatives. The swelling of the abdomen soon was relieved. An examination per rectum then revealed a solid flattened irregular mass lying in the hypogastric region, to which was attached a curved elongated hollow mass, evidently a portion of the small intestine fixed by adhesions. The child's general condition improved greatly by a fortnight's stay in the hospital, but the condition found by rectal examination did not alter. There is little doubt that there was some chronic matting of the bowel, due, no doubt, to tubercular deposit in the peritoneum, and the diagnosis was much assisted by the examination by the bowel.

The following case illustrates the value of this method of examination in abnormal conditions in the upper regions of the abdomen. A female child, 3 weeks old, was admitted into the wards of the North-Eastern Hospital for Children for a swelling of the abdomen, which had existed since birth, and which had been rapidly increasing. The infant was thin and pale. The abdomen was much swollen, especially in the right hypochondriac region, in which could be felt a smooth roundish solid lump, moderately moveable, and extending

downwards to below the level of the umbilicus and across to just beyond the median line of the abdomen. It was dull on percussion, and the dulness was continuous with that of the liver. It was obviously a tumour, either of the kidney or of the liver, and by the ordinary clinical methods one was unable to say which. By rectal examination, however, the kidney could be distinctly palpated, and the tumour was found to lie quite in front of it, and was evidently not attached to it in any way, for the finger could be passed freely between the tumour and the kidney; it could also be felt continuous with the liver. Hence the diagnosis of a liver tumour was made, and an abdominal section being performed by my then surgical colleague, Mr. H. I. Curtis, a sarcoma of the liver was found. It was unfortunately so connected with the liver as to be inoperable, and the abdomen was closed.

The following case shows how even small objects in the cavity of the abdomen may be felt by rectal examination. I am indebted to my colleague, Mr. Douglas Drew, for permission to publish extracts from the notes. S. T., aged 4 years, was admitted to the North-Eastern Hospital on account of vomiting and passing a diminished amount of urine, which contained pus and a small quantity of albumen. There was some pain at the tip of the penis and in the left inguinal region. A renal stone being suspected, the bladder was sounded, and a stone felt, which was removed by suprapubic cystotomy. The patient did not progress favourably, and the vomiting persisted, and another stone was passed per urethram, and occasional attacks of severe pain in the inguinal region occurred. After repeated examinations, a shadow was seen by the X-rays just above the loin of the pelvis on the left side. Chloroform being administered, on abdominal examination the left kidney was found to be enlarged, and the finger in the rectum felt a hard triangular body, about the size of a hazelnut, on the left side of the abdomen just above the upper limit of the bladder; this was taken to be a stone impacted in the ureter. At the operation which followed immediately this diagnosis was verified in all details, and another stone was also removed from the pelvis of the left kidney. Unfortunately the opposite kidney was so diseased from the presence of numerous calculi that the patient died a fortnight later.

This case illustrates, I think, the extreme delicacy of this mode of examination; a very small object, the existence of which could not be even suspected by abdominal examination, was so easily palpated that its exact size and shape were described.

It would be useless to add further examples to these already given, which show the delicacy of the method and also the extent to which the abdomen may be palpated, and it was especially to show the great value of this examination in obscure diseases within the abdomen that this paper has been written.



NOTE ON THE EFFECT OF THE RAW MEAT TREATMENT ON THE PERCENTAGE INCIDENCE OF HÆMOPTYSIS IN PULMONARY TUBERCULOSIS.

By ISABELLA MEARS, L.R.C.P.I.,
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SINCE the introduction of the open-air treatment of Phthisis Pulmonalis, many of its classical symptoms have been mitigated or have entirely disappeared. Sweating, for example, requires now no direct therapeutic treatment, the persistence of this symptom being usually the evidence of a faulty method and of an insufficient supply of fresh air. In a less degree and more slowly, cough and malnutrition, except in the most advanced cases, are alleviated and finally disappear. In turn it is to be hoped that recurrent hæmoptysis, hitherto a symptom of comparatively frequent occurrence, will also disappear under the new régime.

In tabulating the results of the treatment at Woodburn Sanatorium during four years (October 1899 to October 1903), I have been much impressed by the fact that there has been an almost total immunity from pulmonary hæmorrhage during the time that patients have been under treatment in the Sanatorium. This immunity has been especially marked in the last three of those years, when the raw meat treatment was more fully and definitely carried out than during the first year.

As the special feature of the Woodburn treatment lies in

the large proportion of raw proteid in the dietary, it would seem probable that therein lies the explanation of the observed immunity from hæmorrhage.

The most recent statistics on hæmoptysis are those given in the 1st Annual Report of the Henry Phipp's Institute, 1904, p. 25, and may be quoted :—

Cases reported on, 1644.

Hospital patients with hæmoptysis - - 135

Dispensary patients with hæmoptysis - - 650

Total - - - - 785

The Report states elsewhere that 254 patients were treated in the wards. This gives 53·1 as the percentage incidence of hæmoptysis in hospital patients under treatment.

Osler states¹ that :—"Hæmoptysis occurs in from 60 per cent. to 80 per cent. of all cases of pulmonary tuberculosis." Further :—"In a majority of all cases the bleeding recurs. Sometimes it is a special feature throughout the disease, so that a hæmorrhagic or hæmoptysical form has been recognised."

In this note the term hæmoptysis includes only those cases in which there was actual free blood in the sputum, and not merely a tinge of pink. A slight tingeing or streaking of the sputum frequently occurs when patients are doing well, and may be nasal or pharyngeal in origin. When definitely pulmonary it is probably the result of oozing from a granulating surface. It is an indication of good vascular supply to the granulation tissue lining the cavities, and that this has been disturbed by excessive exercise or even by coughing, which has given rise to an extra degree of hyperæmia in the diseased area.

The total number of patients admitted to Woodburn Sanatorium during the time above specified was 152.

Before Admission.—There is definite history of previous hæmoptysis in 30, or 19·7 per cent., of the cases admitted. In 16, that is, in 53·4 per cent. of these 30 cases, there were recurrent attacks.

After Discharge.—Ten patients, or 6·5 per cent. of all those admitted, had hæmoptysis after leaving the Sanatorium.

¹ *Principles and Practice of Medicine*, by William Osler, M.D., Fifth Edition, 1903, p. 303.

Five (of whom four had history of previous hæmorrhage) were cases of long-standing disease which had been alleviated and in some degree arrested during treatment, but the benefit was not permanent. One was an early acute case, and the only one of the ten who had hæmorrhage during residence. In the remaining four instances the hæmorrhage was the direct result of over-exertion; these four patients are now convalescent or cured, they have had no recurrence since the attack above mentioned.

During Residence.—Hæmoptysis occurred in five, or 3·2 per cent., of the cases admitted.

DETAILS OF CASES.

Case 1.—Had one hæmoptysis (November 1899) within a fortnight after admission. He had had recurrent attacks before admission.

Case 2.—Had several slight hæmoptyses (January 1900) three months after admission. He had had severe recurrent attacks before admission, one nearly proving fatal.

Case 3.—Had a number of slight hæmoptyses during the first four months of his treatment (December 1899 to April 1900). Thereafter his sputum was frequently tinged until the sputum finally disappeared. He had had streaking of the sputum before admission. This was an early acute case.

Case 4.—Had one slight hæmoptysis (March 1903) a month after admission. He had had severe recurrent attacks shortly before admission, and had a return of hæmorrhage after discharge.

Case 5.—Had two slight hæmoptyses (December 1903 and January 1904). He had had recurrent attacks before admission, but none since leaving the Sanatorium.

In none of the cases was the hæmorrhage of more than moderate severity, the total amount of blood lost during an attack never exceeding 8 to 10 ozs. Several of the patients had been undergoing open-air treatment with ordinary diet before admission.

It will be noted that in three of the above cases the hæmoptysis occurred shortly after the opening of the Sanatorium in October 1899, and before the treatment had been systematised. As the benefit of the raw meat dietary became

apparent in the alleviation of this and other symptoms, it was more extensively used, and has been routine treatment since 1900.

Hæmorrhage occurred in only two of the 114 cases received after October 1900, giving 1·7 as the percentage incidence of hæmoptysis during treatment in all cases admitted during a period of three years. These two patients had each had severe recurrent attacks before admission. The hæmorrhages which occurred during treatment were in small quantity, and were the direct result of over-exertion.

That this almost complete immunity from hæmoptysis during a period of three years is not a mere coincidence is sufficiently proved by the high percentage incidence of previous hæmoptysis, in many cases recurrent. It should perhaps be stated that the cases embraced every variety, from slight lesion at one apex to extensive disease of both lungs with cavity formation and secondary infection of other organs.

SUMMARY.

Percentage Incidence
of Hæmoptysis.

Total cases treated from 1899 to 1903 -	152	
„ „ with hæmoptysis before treatment- - -	30	19·7 per cent.
„ „ with hæmoptysis after treatment - - -	10	6·5 „
„ „ with hæmoptysis during treatment - - -	15	3·2 „
„ „ treated rigidly on raw meat (1900-1903) - -	114	
„ „ of hæmoptysis on raw meat treatment - - -	2	1·7 „

These results would seem to bear witness to the practical value of raw meat as a therapeutic agent in the prevention of hæmoptysis during the treatment of pulmonary tuberculosis.

The years 1899 to 1903 only are included in the above *résumé*, because sufficient time has elapsed since then to give the after history of the patients a definite statistical value. This has been followed in every case up to date. Cases admitted subsequent to October 1903 are therefore excluded, but so far as the period of residence is concerned the figures are equally convincing.



Prize Essay.

THE TREATMENT OF A STRANGULATED INGUINAL HERNIA.

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TAXIS.

TAXIS should not be attempted if definite symptoms of strangulation have persisted for more than twenty-four hours, or if it has already been tried by a competent hand. The patient lies on an operating table or on a high hard table; bed is unsuitable. The surgeon—if the hernia is on the right side—with the left hand endeavours to *disengage* and loosen the contents by pushing downwards the neck of the hernia: while doing this, he makes uniform pressure over the hernia with the right hand pushing upward. The right leg should lie extended and everted at first; if taxis fails in this condition, the flaccid leg should be flexed and inverted by an assistant. The manipulations should be gentle and purposeful, the surgeon calling to mind all the time the relation of the parts with which he is dealing to one another, and their probable condition. A sudden slip, perhaps accompanied by a gurgle, indicates satisfactory reduction, and the finger passed into the inguinal canal finds it empty. Reduction in mass must be suspected if fulness or a lump is still to be felt at the top of the inguinal canal.

OPERATIVE PRELIMINARIES. ANÆSTHESIA.

Taxis failing, operation should be done at once. The line of treatment which comprises: rest in a bed with its lower end raised; knees over pillow; hot bath; opium; ice-bag to swelling is quite right for obstructed, incarcerated, inflamed or recent irreducible herniæ, but is wrong for strangulated herniæ.

I prefer local anæsthesia. If a general anæsthetic is given, taxis may again be attempted, although, if taxis is then successful, one should, I think, still operate, unless there are special

contra-indications, in order to avoid future risks of strangulation.

All preparations for the operation being made, if possible in a room other than that in which the patient is, he is brought in and placed on an operating table (hospital, portable, or improvised) with his feet towards the light. The stomach is now washed out with warm water, using a funnel and tube; the comfort and safety of the patient is thereby greatly increased, particularly if much fæcal vomiting is present.

The patient's head is now screened off, either by a linen screen stretched over a copper-wire framework, which can be easily fitted to an operating table, or by some improvised screen, and the anæsthetist with all his apparatus ready remains near the patient's head to reassure him.

The operator isolates the operation area with mackintoshes; one mackintosh is underneath the patient. The remainder of the body is kept warm with hot bottles and blankets, or the limbs and chest may have been previously wrapped in gamgee tissue. The area exposed should include the umbilicus, the genitals, and the upper part of the thigh; green soft soap or ether soap with pieces of gauze or gamgee is used to clean the area. The nail-brush should be used gently, or not at all, if the patient's skin is delicate. In the course of the cleaning the parts are thoroughly shaved. In females this process can be carried out by a competent nurse.

Next, the operation area is surrounded with sterilised towels tucked well under the edges of the mackintoshes and drawn closer to the site of the incision than the mackintoshes. A further cleaning takes place, followed by washing with normal salt solution (boiled water or carbolic or biniodide solution may be used instead), and drying with alcohol or methylated spirit.

Local anæsthesia is now induced. For this I prefer eucaine and adrenalin, as recommended by Barker in the *British Medical Journal* for December 24, 1904. Three grains of beta-eucaine and 12 grains of sodium chloride are boiled in a glass flask with $3\frac{1}{2}$ ounces of distilled water; this makes a solution isotonic with the body fluids. The solution is cooled to blood heat and 10 drops of adrenalin added from its original bottle. The solution may also be prepared by using Parke Davis's

"eudrenone." This contains 1 per cent. of beta-eucaine hydrochloride and 3 per cent. one in a thousand adrenalin chloride in normal salt solution. To one part "eudrenone" add four parts normal salt solution, which may be prepared from Parke Davis's tablets of sodium chloride ; boil before use or make with boiling water.

With regard to syringe, Barker describes a special one in the article referred to above. I prefer one I have had made with short, sharp needles for the skin, and longer blunt ones for the deeper tissues. After superficial anæsthesia, the skin can be punctured with a tenotomy knife to provide an opening for making the deeper injections. For this operation an ordinary antitoxin syringe does very well. After superficial injection over a liberal area, the inguinal canal and the region of the neck of the sac should be injected. The injections take from ten to fifteen minutes acting, and during that time a final preparation of the hands is made, and a large sterilised linen sheet with a slit in it put over the patient ; the edges of the slit are attached by stitches to the skin, close around the site of incision. This arrangement prevents the sheet slipping, and is particularly important here to prevent the operator's hands coming into contact with the genitals.

OPERATION.

The incision is made nearly parallel to, and about half an inch above, the inner half of Poupart's ligament, inclining somewhat upwards at its outer end ; the incision does not reach the scrotum, which is not exposed in the operation area, superficial structures are divided and turned back until the pillars of the external ring are clearly exposed ; the various coverings of the hernia are then divided in the length of the wound by picking up and nicking, and then inserting a pair of blunt-pointed scissors ; often all the coverings, and almost always the cremaster, can be identified. The common difficulty now with operators, particularly those with little experience, is to think that they have reached bowel when they have only reached sac. Usually the bowel has a reddish-black, smooth look ; while the sac is fibrous, with interlacing filaments externally, and is smooth internally ; often there is fluid between the sac and the bowel ; sometimes the sac is

smooth, looking very like bowel ; then the doubtful structure must be traced up to the neck of the hernia, when bowel will be found entering the abdominal cavity, sac blending with the abdominal wall. The sac is well opened, and any fluid mopped away ; if omentum and bowel are both present, omentum will be in front ; on lifting it up, bowel will be seen. The stricture is now divided, directly forwards and upwards, with ordinary hernia director and curved hernia-knife ; such division should be a mere nick, further breaking down of the constriction being done with the finger or a blunt instrument. The strangulated parts should not then be pushed up into the abdomen, but drawn well down into the wound, and the site of constriction inspected. Omentum should be ligatured in mass with a piece of fairly stout silk, the assistant slacking down the omentum while the knot is drawn tight ; the omentum is then cut off quarter of an inch distal to the ligature, and the stump pushed back into the abdomen. If the bowel is in good condition, it is returned well within the abdomen, and the operation concluded by doing a radical cure, thus :—

The sac is isolated, particular care being taken in separating it from the spermatic cord in the male, ligatured at its neck and cut off ; the two ends of ligature left long are brought through the abdominal muscles above and outside of the canal, tied together so as to anchor the neck of the sac in this situation, and then cut short : the cord is isolated and held forwards and inwards by a fold of gauze ; the conjoined tendon and Poupart's ligament are cleared by a little dissection, and these two structures are united behind the cord by a sufficient number of interrupted silk sutures, ample room being left at the top of the line of union for the cord to pass through. The needle used for doing this should be blunt-pointed and round-bodied, so that it may not produce hæmorrhage when passed. Further interrupted silk sutures now close the cut made in dividing the constriction, the coverings of the cord, and the subcutaneous tissue ; the wound is thus closed in layers, and left bloodless and without spaces ; a continuous silk suture is used for the skin, and a sealed dressing of gauze and collodion applied, over which, when dry, a pad of sterile gamgee fixed with a firm spica bandage.

CASES IN WHICH THE VITALITY OF THE BOWEL
IS DOUBTFUL.

It is good to know that where the bowel is in a state which one would describe as "suspicious" it is more likely to live than to die. The condition varies. So sharp may have been the constriction that at its site may be found a deep narrow line with a grey sloughy appearance, suggesting future perforation. Such a line may be covered in by invaginating it and bringing adjacent peritoneum together over it by Lembert's sutures. More commonly the portion of bowel of which the vitality is doubtful is at the fundus of the strangulated portion. The doubtful area may be the size of a shilling or more or less. The bowel is nearly black, has lost to some extent its gloss, is sticky, and bleeds little or not at all on pricking. In such cases nothing should be done hastily. See that the circulation of the vessels in the mesentery is unimpeded, and then dab the bowel gently with mops out of warm salt solution : I have sat doing this for quarter of an hour watching the circulation re-establish itself in a piece of doubtful bowel.

If the bowel is lax and there is not much fat in the mesentery, the bowel is "telescoped" over the doubtful area and fixed with Lembert's sutures.

In these cases, the bowel should be left just inside the internal ring—some operators anchor it there by a stitch—and the subsequent operative procedures modified so as to permit a glass or rubber drainage tube to be passed down to the site of the bowel, such tube being removed in forty-eight hours.

CASES IN WHICH THE VITALITY OF THE BOWEL IS LOST.

The bowel has lost its gloss and there is no circulation in it ; it is black or grey or green, or all these colours, sticky and pulpy and collapsed : it may have actually perforated : there is an offensive smell when the sac is opened, and the sac may contain offensive fluid. Various courses are open, depending, first, upon the condition of the patient ; secondly, upon the condition of the bowel and the extent of its destruction ; thirdly, upon the experience of the operator.

By invaginating or telescoping, small defects may be covered in as described under doubtful vitality, the bowel being subse-

quently anchored just inside the internal ring and a drainage tube passed down to it.

What is to be done when the devitalised portion is larger ? It is to be remembered in these cases that what the patient is suffering from is not the strangulation itself, but the toxæmia from the retention of bowel contents which follows the strangulation, and therefore it is this retention which must be relieved. Where the gangrene is but a patch not involving the whole circumference, the wisest plan is still to anchor the gangrenous patch in the ring and permit a fæcal fistula to form : one never knows how much of the bowel will recover. If the bowel has not already perforated, do not incise it, it is better to let it break down itself when adhesions have formed : if severe toxæmia indicates immediate emptying, fasten a Paul's or other form of intestinal drainage tube into the centre of the gangrenous patch.

To bring the damaged bowel out of the wound supporting it by a glass rod through the mesentery is not in my opinion a good practice, because all the intestinal contents pass out of the wound, and if the opening in the bowel happens to be high up the patient will speedily die of inanition, unless something further is done, and in the circumstances difficulties often arise in getting the patient and his friends to consent to a second severe operation.

Where the gangrene is extensive or involves the whole or nearly the whole of the circumference of the bowel, proceed as follows :—Enlarge the parietal wound upwards as far as necessary ; bring the damaged bowel well out and isolate it ; if the severity of the toxæmic symptoms indicates immediate bowel drainage, fix a Paul's tube in the bowel well above the site of the damage, allowing the bowel to drain through an india-rubber tube attached to this during the subsequent procedures. Resect the damaged piece of bowel : here the operator will use the method he is most expert with ; I prefer end-to-end suture without any special appliances beyond pairs of fine tenaculum forceps to hold the cut bowel edges together. Lateral anastomosis, Murphy's button, Mayo Robson's bobbin, or other special method may be used at the preference of the operator. Doyen's clamps or some other form of intestinal clamp are used to keep the intestinal contents from the site of

resection. Return the resected bowel within the abdomen ; close the parietal wound with the exception of its upper end in which the piece of bowel containing the Paul's tube is fixed : if no such tube has been used close the wound with drainage. The fæcal fistula which results from the use of the intestinal drainage tube closes up usually without further interference.

It may be thought that not many patients are in a condition to stand prolonged operative measures such as those above indicated. When, however, the constriction is relieved and bowel drainage is established, the condition of the patient usually improves, especially with appropriate stimulation, of which the most important form is intravenous or subcutaneous saline infusion, and the remaining steps of the operation may be proceeded with without haste. Where the condition of the patient is desperate the damaged bowel must be left outside and further operation deferred for from 24 to 48 hours.

UNUSUAL CONDITIONS IN THE HERNIA.

These can only be referred to. Partial enterocele (Richter's hernia) requires special care : these cases have a high mortality, the bud of bowel involved being often severely damaged. Cæcal hernia, congenital hernia, adhesions of bowel in the sac, and other conditions all require modifications in the operation.

ANÆSTHESIA.

A general anæsthetic is required throughout the operation in children, in restless or nervous patients, or in those patients who earnestly desire it. It is more important with general than with local anæsthesia to wash out the stomach first in order to prevent drowning of the patient in fæcal vomit. The choice of anæsthetic must depend upon the circumstances of each case. The choice of the anæsthetic is not so important as having a competent anæsthetist.

During the later stages of the operation, particularly when the cord is being handled, it may be necessary to give a little general anæsthetic. In females the operation can usually be completed under local anæsthesia. Besides the less amount of general anæsthetic required, local anæsthesia preceding general is of value in diminishing shock at the time of, and preventing pain after, the operation.

[Some additions have been made to the original article by the author.—ED.]

A REVIEW OF SOME RECENT WORK IN
DISEASES OF THE INTESTINE.

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Infantile Diarrhœa and the Bacillus Dysenteriae.—A valuable and elaborate report has been issued by the Rockefeller Institute for Medical Research on the diarrhœal diseases of infancy, with reference to the bacillus dysenteriae. The investigation was carried out by a number of investigators, during the summer of 1903, in Boston, New York, Philadelphia, and Baltimore. The monograph contains a number of bacteriological and clinical reports summarized by Prof. Flexner and Dr. Emmett Holt respectively. In the previous summer (1902) Messrs. Duval and Bassett examined 53 cases of infantile diarrhœa in Baltimore, and found the bacillus dysenteriae in 42; this bacillus was, moreover, agglutinated by the blood serum of the affected children, but not by that of healthy children. Further, as the bacillus could not be obtained from the stools of healthy children, the authors concluded that the bacillus of dysentery was an important, if not the most important, cause of infantile summer diarrhœa. The collective investigation carried out during the following summer was superintended by Prof. Flexner, and dealt with the bacteriological examination of 412 cases of diarrhœa in children, with the result that 279, or 63·2 per cent., showed the presence of the bacillus dysenteriae.

The organism is not contained in the dejecta in the same quantities as it is in the mucous membrane of the intestine; gentle scraping of the rectal mucosa will yield material from which the organism can be recovered in cases in which it has not been isolated from the fæces. Further, the observation that the organism increases far less readily, and is easily overgrown, in discharges outside the body, shows that it is less well adapted for a saprophytic than for a parasitic existence. The organism is more often present in mucofæcal stools than in those containing blood. Nothing is

known as to its existence outside the body, and repeated investigations have shown that it is not present in the dejecta of healthy persons or infants. It has, however, been isolated in small numbers from the stools of healthy infants, to whom mild catheters had been given, and Professor Flexner throws out the tentative suggestion that the bacillus is a saprophytic inhabitant of some parts of the intestinal tract, and that factors which seriously interfere with the nutrition and functions of the intestinal mucosa may enable the bacilli to acquire parasitic and pathogenic properties. The bacillus dysenteriae was described originally by Shiga in Japan, and was also recognised by Flexner in the Philippines, but subsequently it was found that the organisms they described differed in some particulars; *B. dysenteriae* (Shiga) not acting upon mannite, while the "Flexner-Harris," or "acid," strain did so energetically. The type of dysentery bacillus present in the cases of summer diarrhoea was chiefly the so-called Flexner-Harris, the Shiga type being only exceptionally met with, occasionally both were present. The blood serum of cases showing the organism in the stools may agglutinate the organism in high dilutions, but this reaction may persist long after the organisms have disappeared. The morbid appearances in the fatal cases were very far from constant. No dogmatic decision is reached on the question whether the organism is to be regarded as the prime cause of all the lesions; in many instances streptococci were present, and it is possible that other organisms may play an active part in the disease. *Clinically*, infection with bacillus dysenteriae was associated with the inflammatory forms of diarrhoea in all grades of severity, but not with the severe acute intestinal intoxication called "cholera infantum." In what may appropriately be termed infantile dysentery, the stools contained much mucus and were usually streaked with blood. The disease is contagious, but not highly so, and is conveyed by means of the discharges. It is, therefore, a good rule that in hospitals the nurse who looks after the napkins shall have nothing to do with the food or feeding of the infants. Anti-dysenteric serum was employed in 83 cases, 38 of which were fatal. In 12 cases there was improvement and no unfavourable results followed, though in a few instances eruptions, usually

urticarial, were noted. This result is disappointing, but the difficulties in using the serum were considerable, and Dr. Holt does not consider that an adequate trial was really made. As it takes nearly two days for a bacteriological diagnosis, the serum must be injected on a clinical diagnosis. The amount usually injected was 10 c.c. daily for a moderate case, while this was given twice or thrice a day in a severe case. The injections gave rise to a good deal of pain, this, together with the swelling produced, were often too much for the mother's feelings, and thus interfered with the treatment.

INTESTINAL ULCERATION.

As bearing on the *causation of duodenal ulcer*, it is interesting to refer to the old and almost forgotten hypothesis put forward by Curling,¹ in 1842, to account for the occurrence of these ulcers in cases fatal from burns. The suggestion was to the effect that Brunner's glands became extremely active in the attempt to act vicariously for the extensive area of the sweat glands, which had been destroyed by the cutaneous burn, and that this extreme activity passed on into inflammation, and subsequently to ulceration. Recently, Brunner's glands have again been thought to play a part in the production of some duodenal ulcers; though, of course, in a rather different manner. Besse² and De Rouville³ have described duodenal ulceration secondary to adenomatous changes in Brunner's glands. Besse found multiple ulcers over the adenomata, the mucous membrane being atrophied where it was stretched over the small tumours. In the case reported by De Rouville, there was fatal perforation of the first part of the duodenum secondary to an adenomatous condition of Brunner's glands. Around the ulcer there was much thickening, due entirely to enormous proliferation of Brunner's glands, which depressed the muscular coat and penetrated, more or less, between its fibres. The adenomatous formation was degenerated near the ulcer, as was also the underlying muscular coat. The process is the same as that described by Hayem, in 1897, at the pyloric end of the stomach, as

¹ Curling, T. B.: *Medico-Chirurg. Trans.*, Vol. VII., p. 276, 1842.

² Besse: *Archiv. de Méd. expériment. et d'Anat. path.*, Tome XVI., p. 388, 1904.

³ De Rouville: *Bull. et Mém. Soc. de Chirurg.*, Paris, 1905, p. 310.

"Gastric ulcer produced at the expense of a polyadenoma of the type of Brunner's glands." There are, therefore, two forms of duodenal ulcer: (a) the ordinary variety, with more or less acute inflammation of the connective tissues; and (b) that depending on changes in Brunner's glands. Moynihan,¹ having operated upon 51 duodenal ulcers in less than four years, points out that the disease is by no means so rare as it is usually stated to be, and that, as both his own statistics and those of W. J. Mayo, of America, show, gastric ulceration is present in 50 per cent. of duodenal ulcers. The reason for this association is that the hyperchlorhydria accompanying gastric ulcer sets up a similar change in the first part of the duodenum.

Peptic ulcer of the small intestine, resembling the well-known ulcers in the stomach and duodenum, has only been recognised of recent years, the first example being described five years ago by Braun. It occurs as a result of gastro-enterostomy, and has been produced experimentally in dogs in this way by S. H. Watts,² who also collected 14 cases after gastro-enterostomy in human subjects, all from German literature. The first case in England was recorded by Mayo Robson,³ who brings the list up to 16, and, like Watts, finds that this sequel is more likely to follow anterior than posterior gastro-enterostomy; thus, of the 16 cases, 11 followed anterior, and only 2 the posterior operation. In 30 anterior gastro-enterostomies one case of peptic ulcer occurred; but in 236 posterior gastro-enterostomies there was no case. It is suggested that the anterior operation does not drain the stomach so efficiently as the posterior form of gastro-enterostomy, and that, therefore, hyperchlorhydria, which apparently plays a part in the production of peptic ulcer of the jejunum, is not so completely relieved. When ulceration of the small intestine does follow the posterior operation, there is not the same tendency, as in the case of peptic ulcers after the anterior operation, to the formation of adhesions; thus, in 11 peptic ulcers following anterior gastro-enterostomy, the peritonitis was localised in 8, and diffuse in 3;

¹ Moynihan: *Lancet*, 1905, Vol. I., p. 340.

² Watts: *Johns Hopkins Hosp. Bull.*, Vol. XIV., p. 191, July, 1903.

³ Robson, A. W. Mayo: *Medico-Chirurg. Trans.*, Vol. LXXXVII., p. 339; and *Annals of Surgery*, Vol. XL., p. 186, August, 1904.

whereas, in the 2 cases following the posterior operation, there was general peritonitis. The symptoms of jejunal ulcer are much the same as those of gastric ulcer. The burning pain in the epigastrium is usually severe, is temporarily relieved by taking food, but returns with greater severity in an hour or two. Vomiting is frequent.

Exogenous Perforative Ulceration.—The common form of ulceration and perforation of the gastro-intestinal tract, which starts in the mucous membrane and spreads from within outwards, is termed by Professor Adami¹ "Endogenous," in contradistinction to the rarer condition in which an abscess bursts into the alimentary canal from without inwards, or exogenous perforative ulceration. The name "Primitive ulceration of the peritoneum" was applied to the latter, as long ago as 1834, by McAdam, in his article on Peritonitis in Forbes's *Cyclopædia of Practical Medicine*, and the condition is, of course, familiar to both pathologists and clinicians. Still, it has met with somewhat meagre attention, and a systematic description of the condition, such as Professor Adami gives, is deserving of attention. It is by no means so rare as might be anticipated; thus, in 700 autopsies at the Royal Victoria Hospital, Montreal, there were no less than 17, or 2.4 per cent., cases of this exogenous perforation, as compared with 63, or 9 per cent., of endogenous perforative ulceration. The cases of exogenous ulceration fall into two broad groups:—

(I.) The fistulous, in which inflammation in one viscera leads to adhesion to some part of the alimentary tract, and subsequently to the extension of ulceration, or discharge of an abscess into the stomach or intestine. Cholecystico-duodenal fistula, and a pyonephrosis discharging into the colon, are examples in point.

(II.) Those due either to localised purulent peritonitis or to retroperitoneal abscess are more characteristic and, on the whole, more serious. This group contains perityphlitic abscesses opening into the bowel, the most frequent cause of exogenous ulceration, perinephritic and pelvic abscesses perforating into the alimentary canal.

In exogenous ulceration it is essential that the suppurative

¹ *Montreal Medical Jour.*, June, 1903.

process should be localised, so that increasing pressure is brought to bear on the walls of the abscess cavity. This overcomes the remarkable power of protection possessed by serous membranes against erosion from without. The destruction of the intestine wall in the region of the perforation is more extensive in the serous and muscular than in the mucous coat, which tends to be raised up and perforated, or netted, so as to resemble a piece of netting. The elevation of the mucous membrane is due to pus, which has worked its way into the wall of the bowel from without, collecting in the lax sub-mucosa and forming an abscess there. The mucous membrane is thus cut off from its nutrition and becomes perforated at several points. In more advanced cases a strip of mucous membrane may be seen bridging over the loss of substance beneath.

CYSTS OF THE INTESTINE.

A remarkable *intraduodenal cyst in connection with the ampulla of Vater* was described by Dr. Trevor.¹ It was found in the body of a man of 24 years of age, who died from the effects of a perforating duodenal ulcer, but had not presented jaundice or any symptoms referable to the presence of this cyst. The cyst, which was as large as a tangerine orange, was lined inside and out by intestinal mucous membrane, and contained 3 ounces of bile, but no calculi. This apparently unique condition was explained as a congenital abnormality, whereby folds of mucous membrane often normally present in the neighbourhood of the biliary papilla had united over it.

Terrier and Lecène² record an example, and review the literature of *enteroid or juxta-intestinal cysts*, which they regard as being derived from the remains of Meckel's diverticulum, though other interpretations, such as an aberrant ovarian cyst or a Wolffian cyst, have been suggested. The characteristics of these enteroid cysts are that (i) they are usually (15 out of 18) situated near the lower end of the ileum or at the ileo-cæcal angle, (ii) they are unilocular (17 out of 18), (iii) have viscid contents, and (iv) are often (11 out of 18) met with in babies. They may be submucous (3 out of 18), between the muscular coats of the intestines (7 out of 18),

¹ Trevor, R. S.: *Trans. Path. Soc.*, Vol. LVI.

² Terrier and Lecène: *Rev. de Chirurg.*, Tome XXIV., p. 161, 1904.

or under the peritoneum (8 out of 18). They may be either at the mesenteric or at the free border of the intestine. In the author's case there was a large tumour on the right side of the abdomen, which turned out to be a cyst the size of one's fist, connected to the cæcum. The cyst was lined by papillæ, which were covered with goblet cells, and contained viscid fluid. There was abdominal pain, vomiting, and ascites. Removal was followed by recovery; there was no return of the ascites.

ACQUIRED DIVERTICULA OF THE INTESTINE.

Acquired or false diverticula are so called in contradistinction to the diverticula which are of congenital origin.

Diverticula of the vermiform appendix, lined by mucous membrane, are hernial protrusions of the mucosa through the muscular coat, and are regarded by Lejars and Ménétrier¹ as the result of inflammatory destruction of the wall of the appendix. The communication between the lumen of the appendix and the cavity of the diverticulum may be comparatively small, and in a series of transverse sections a point may be reached where two cavities, distinct from each other, one inside, the other outside the muscular coat, may be seen. As the diverticula are often multiple, as many as three distinct cavities may be seen in some specimens. The practical importance of these diverticula is that having thin walls—only mucosa, fibrous tissue, and peritoneum—any infective process readily spreads or perforates into the peritoneal cavity. These diverticula, from their conformation, favour stagnation and multiplication of micro-organisms, and may thus cause diverticular appendicitis. The diverticula are not uncommonly situated close to the attachment of the meso-appendix, and in this way suppuration may spread into the meso-appendix, and set up retroperitoneal suppuration in the iliac fossa.

Rixford² has recently called attention to the clinical importance of *inflammation of the appendices epiploicæ and intestinal diverticula* in a paper describing two cases in which inflammation of an appendix epiploica depended on infection conveyed from an acquired or false diverticulum of the colon.

¹ Lejars and Ménétrier: *Rev. de Chirurg.*, T. XXIV., p. 469, October, 1904.

² Rixford: *Californian State Journ. of Med.*, Vol. II., p. 296, October, 1904.

The inflamed appendices epiploicæ were palpable clinically as tumours, the size of a walnut in one instance, and of a hen's egg in the other case, and were successfully removed. These cases may imitate appendicitis on the left side of the abdomen, or malignant disease of the colon. The clinical symptoms are usually comparatively mild, and are rarely comparable to those of rapid appendicitis. The diagnosis from appendicitis rests on the absence of tenderness at the base of the appendix as estimated by rectal examination, and on the history of obstinate chronic constipation. Mr. Bland Sutton¹ has described cases of fæcal abscesses in the appendices epiploicæ due to the passage of small, but sharp, foreign bodies from the colon into the interior of the appendices epiploicæ, and throws out the suggestion that some cases of spontaneous disappearance of solid abdominal tumours having all the clinical characters of malignant disease, such as those described by the late Professor Greig Smith, may have been of this inflammatory nature. Stercoral ulceration in false diverticula of the colon may induce local peritonitis, local abscess, or general peritonitis. The occurrence of diffuse peritonitis may depend on direct perforation into the general peritoneal cavity, or as the result of rupture of a localised abscess, as in a case recorded by the writer.²

TUMOURS OF THE INTESTINE.

Among the rare or *unusual forms of carcinoma of the intestine* considerable attention has recently been directed to the number of anatomically distinct growths which may arise primarily in the neighbourhood of the biliary papilla. Thus, as Dr. Craven Moore points out, within an area having a radius of no greater than one quarter of an inch, one may find a columnar-celled carcinoma artery in the mucous membrane covering the duodenal surface of the biliary papilla, from that lining the ampulla of Vater [*i.e.* the common channel within the duodenal wall by which the common bile duct and Wirsung's duct communicate with the duodenum], from the lower end of the common bile duct, possibly from the termination of Wirsung's duct, and, lastly, a spheroidal-celled carcinoma of the head of the pancreas.

¹ Bland-Sutton: *Lancet*, 1903, Vol. II., p. 1148.

² Rolleston: *Lancet*, 1905, Vol. I., p. 54.

As a natural result of their close proximity, confusion often arises between these different forms of new growth, especially between carcinoma of the duodenal surface of the biliary papilla and primary carcinoma arising from the mucous membrane of the diverticulum or ampulla of Vater. Two careful reports of cases of primary *carcinoma of the ampulla of Vater* have recently been published by Klotz¹ and Craven Moore.²

In Craven Moore's case there was ill-health for nine months, the onset being marked by loss of appetite, pain, and occasional vomiting after food. The symptoms got worse, jaundice set in four months before death, diarrhoea was constant, and vomiting occurred several times a day. The liver was enlarged, and the gall-bladder easily palpable. There was great emaciation, which formed a remarkable contrast to the small growth, limited to the ampulla of Vater, that had caused the patient's death from cachexia. The growth was a columnar-celled carcinoma; there were no metastatic growths.

Primary carcinoma of the small intestine is a rare disease, as shown by the extensive statistics quoted by Nothnagel, and also by the fact that in 2,200 autopsies at the Johns Hopkins Hospital there were only four examples of primary carcinoma of the small intestine, three being duodenal, and the fourth, the remarkable case of *multiple primary carcinoma of the ileum*, recorded by Bunting.³ The patient, a man of 52 years, died from the effects of a dilated heart, and was not known to have had any symptoms referable to the abdominal condition. The autopsy showed that in the upper part of the ileum, within an area of the intestine, 50 c.m. in length, there were six nodular tumours, measuring from 3 to 7 m.m. in diameter, which projected into the lumen of the bowel, but were nearly all covered by intact epithelium. They were situated opposite the mesenteric attachment, were white in colour, firm on section, and microscopically showed spheroidal-celled carcinoma arising from the crypts of Lieberkühn. The cells were small, with scanty clear protoplasm, and the stroma showed hyaline charge. As there were no growths in other organs, it is evident that the tumours were not secondary to a primary tumour

¹ Klotz : *Montreal Med. Jour.*, Vol. XXXIII., p. 477, 1904.

² Moore, F. Craven : *Jour. Path. and Bacteriol.*, Vol. X., p. 76, 1904.

³ Bunting, C. H. : *Johns Hopkins Hosp. Bull.*, Vol. XV., p. 389, December, 1904.

elsewhere, and it is improbable that one of them was primary, and the others secondary, either by implantation or through the lymphatics, since the intestinal epithelium was intact over the tumours, and there was no infiltration in the immediate neighbourhood of the individual tumours. The tumours were, therefore, independent multiple primary growths. Bunting refers to six exactly similar examples of multiple primary carcinomata of the small intestine recorded by Lubarsch (2), Notthaft, Walter, and Oberndorfer (2). There is, therefore, a distinct group of cases characterised by relative benignity, small size of the tumours, spheroidal-celled nature of the growth, and by not being responsible for the death of the patient. This form of primary intestinal carcinoma resembles the multiple basal-celled carcinomata of the skin of the scalp described by Krompecker, also comparatively benign. It may also be contrasted with Hammer's case of multiple primary cylindrical-celled carcinoma of the jejunum, in which there were numerous and widespread secondary growths. In an appendix to this paper, Bunting records a case of multiple primary carcinoma of the intestinal tract with different clinical characters. A man, aged 59, died after two operations for intestinal obstruction with three ulcerated carcinomatous growths in different parts of the intestines. One was in the upper part of the ileum, another in the cæcum, and the third in the sigmoid flexure. The first was a typical columnar-celled carcinoma, the second was not so typical a columnar-celled growth, and the third, again, showed some slight variation in the type of a columnar-celled carcinoma. There were no growths elsewhere in the body. After discussing the possibility that the growths in the cæcum and sigmoid flexure were due to implantation of cells from the growth in the ileum, the author inclines to the view that the case was one of multiple primary carcinoma of the intestines. Two cases, in which two independent carcinomatous growths were present in the intestines, have recently been described by Mr. Mayo Robson, Dr. Chadwick, and Mr. Knaggs.¹ In the first case, which, however, is wanting in microscopic details, there was a growth in the ileum, presumably cancerous, removed in 1902, and another growth in the rectum detected in 1904. In the second

case there were two distinct columnar-celled carcinomatous growths in the rectum, the intervening portion of the bowel showing a condition of polyposis; the pylorus also showed innocent polypi, and, as the patient was a young man, it is possible that this was an example of carcinomatous change supervening on polyposis.

A case of *osteoma of the small intestine* is reported by Quénu¹ in a woman 40 years of age, who, after symptoms of obstruction extending over four years, was operated upon, the affected portion of the intestine being excised, and recovered. There was a hard stricture with a mass of true bone obstructing the lumen of the bowel; near the stricture there was an ulcer showing the appearance of an alveolar sarcoma; and Landel, who carried out the pathological investigation of the case, regarded the tumour as an ossifying sarcoma derived from the smooth muscular fibres of the intestine. Quénu, however, does not fall in with this view, and, evidently to some extent on the grounds of the prolonged duration of symptoms, regards the primary change as an osteoma, which subsequently gave rise to ulceration, cicatricial stricture, and the sarcomatous appearance. He admits that a primary osteoma of the muscular tissue of the intestine is unique in human pathology, but quotes four cases—Wheatley (1839), Smith (1891), Petit (1902), and Drouin (1894)—of this condition in horses.

¹ Quénu: *Rev. de Chirurg.*, T. XXIV., p. 59, 1904.



Public Health.

A NOTE ON THE LONDON DEATH RATE FOR 1904.

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THE Annual Summary of births, deaths, and causes of death in London and other large towns for 1904, as issued by the Registrar-General is one of the most instructive annual returns published. It is true that eighty-six pages of figures, even though they be vital statistics, do not form for some persons an attractive volume. There is supposed to be something dry and dull about such returns and perhaps even something misleading. For the cursory observer this may be granted. And yet this annual statement is the only comprehensive and complete return of the actual facts respecting life and death in the towns, and from it may be obtained a bird's-eye view of the tendencies of population, of disease, and of mortality. The broad conclusions of such facts, even the tendencies perhaps more than the actual facts for one year, are of importance to every practitioner of medicine. Is it possible in a brief note to state some of these broad conclusions without burdening the page with many tables of figures?

The marriage rate in London (17·0), a city of twenty-nine towns, was lower last year than it had been since 1855, with the exception of 1887, 1888 and 1894. It reached its maximum in 1865, then it declined for twenty years, then it rose slightly in 1898 and has since been declining. The same must be said of the birth rate (27·9) which is the lowest on record. It has been steadily declining since 1867. The decline has been most marked in the districts having the highest social life such as Hampstead and Kensington, and least marked in Bermondsey, Poplar, Bethnal Green and Stepney. Broadly, too, the same may be said of the death rate. In 1866 it was 26·5, in 1904 it was 16·6, which, with the exception of 1903, was the lowest

London death rate on record. It is well known that London with all its disadvantages in respect of size and congestion stands well as regards its death rate among the great cities of the world. It is on the whole one of the healthiest cities that has existed in the history of man. Paris, which has an extremely low birth rate, has a death rate slightly in excess of London; St. Petersburg and Moscow have high death rates, 23·7 and 27·6 per 1,000 respectively, apparently due in large measure to preventable diseases; whilst Berlin approximates more nearly to London both in its total death rate and its death rates from the principal diseases. It is of course low in small-pox. New York had a death rate for 1904 of 22·6, which is higher than the highest rate in London boroughs and much above the rate for London as a whole. The same favourable position of London occurs when compared with the largest towns in this country. There are very few of them which have a lower death rate. In London itself the death rates as would be expected are highest in the centre and lowest at the periphery. Finsbury (21·3), Shoreditch (20·4), Southwark (20·0), Bermondsey (20·0), Stepney (19·4), Bethnal Green (19·3), and Holborn (18·5) may be said to be the central boroughs. Not only do they suffer from position but the general conditions of housing and congestion are more marked than elsewhere in the metropolis. There is the further question of poverty and social condition which certainly exercise a very marked effect upon disease and death rates and which are most operative in the central districts. On the circumference are Hampstead (10·2), Lewisham (12·0), Stoke Newington (13·3), Wandsworth (13·4), and so on, where almost all the conditions of life are better.

A consideration of the certified causes of death will furnish us with some idea of the diseases which are the chief cause of the death rate and possibly of the reason in whole or part for the divergencies in the death rate in the different boroughs. For this purpose it may be sufficient to consider disease as belonging to two main groups, the principal epidemic diseases and general diseases. In the former group the Registrar-General classifies, small-pox, measles, scarlet fever, diphtheria, whooping cough, typhus, enteric fever, and epidemic diarrhoea.

Prior to the outbreak of 1901-02, small-pox had shown a

very marked decline in London. In the decennium 1841-50 the annual mortality per million persons was 402; in 1871-80 it was 457 and in 1891-1900 it was only 10. Of course the great epidemic was in 1871, in which year the annual mortality per million rose to 2,422. The recent epidemic gave only 284, and in 1904 the mortality rate per million fell to 5. Measles shows no such decline, nor does it, like small-pox, come in waves, for though its sickness rate and, indeed, its death rate, varies every two and four years roughly, its mortality per decennium is fairly uniform. In 1841-50 it exacted a toll of 623 lives per million, and half a century later 583 lives per million. In 1904 the figure was 488, which means that 2,261 deaths occurred from this disease in London last year. Further, the greatest incidence of this fatality was in the central boroughs above named. Scarlet fever has shown a marked decline, and in 1903 and 1904 it caused less fatality than in any other years on record. It is well known that the virulence of the disease is lower than in former times, and this appears to be true of the disease contracted from milk and such like materials, as well as when contracted by personal contact. In 1904 365 persons, or 79 per million, died of scarlet fever. Diphtheria, too, shows a marked decline since its maximum fatality in 1893. In 1872 this disease caused the exceptionally low rate of 80 per million. Then it slowly rose, as many believe, owing partly to the elementary education system, until the early eighties, when it began to rise more rapidly, terminating with the mortality rate of 759 in 1893. Since then it has been steadily declining, and is now 157, lower than it has been for 25 years. The decline, of course, is largely to be attributed to the use of antitoxin. The improvement in whooping cough is more real than is generally believed, for in the last fifty years the mortality rate per million has fallen from 867 to 500, and is now 325. The highest rate, as in measles, occurred in central districts. Enteric fever also has fallen enormously, from 979 per million in 1841-50 (including typhus) to 143 in 1891-00. In 1903 it fell again to 83, and last year was 64. Epidemic diarrhoea, on the other hand, shows no steady improvement recently, though during the last 25 years the death rates of this disease are half what they were between 1861-1880.

Here then we have in brief the record of the principal

epidemic diseases, which in the lay mind are looked upon as contributing so largely to the total death rate. We have a marked decline in small-pox, scarlet fever, diphtheria, typhus, and enteric, and a comparative decline in whooping cough and epidemic diarrhoea. Measles, except quite recently, is practically as large a contributor as ever. In the total out of some 77,000 deaths in 1894 about 12,000 were due to these causes in London, and in 1904 out of a total of 77,000 deaths some 10,000 were due to these diseases, the respective death rates for the years being 17·8 and 16·6. There has, therefore, been a marked decline in deaths due to these diseases chiefly due to decline in scarlet fever, diphtheria, and enteric, diseases in which the methods of preventive medicine have been most operative. As a matter of fact, in London these three diseases in 1904 were the cause of death of 1,390 persons out of a total of 77,094 deaths in the metropolis in the year. It is not to these diseases, then, that high death rates are mainly due. Measles and whooping cough claimed 3,768 lives and epidemic diarrhoea 4,801.

Among general diseases those which contribute most largely to the death rate are pneumonia (6,609 deaths in 1904), tuberculosis (10,359 deaths), malignant disease (4,636 deaths), nervous disease (4,458 deaths), cardiac and circulatory diseases (9,455 deaths), and bronchitis (6,373 deaths). With the exception of malignant disease the chief incidence of this fatality falls upon the central districts. For example, the central borough, which had the highest death rate in 1904, had the highest death rate from only one of the principal epidemic diseases, but it was highest but ~~one~~ in phthisis, and very high in bronchitis, nervous diseases, and circulatory diseases.

From these facts several conclusions may safely be drawn. First, there is now an immense saving of life in regard to small-pox, scarlet fever, diphtheria, and enteric fever as compared with twenty years ago. Secondly, there is some saving in measles and whooping cough. Thirdly, there is practically no improvement in epidemic diarrhoea. Fourthly, there is comparatively little or no improvement in the general "preventable" diseases, such as tuberculosis (with the exception of phthisis, which has declined a little even in the last twenty years), malignant disease, nervous diseases, and diseases of

the heart and circulation, and it is these conditions which are mainly contributing to the death rate.

Of the etiology of these diseases (with the exception of tubercle) we know little or nothing. But we do know the enormous effect upon all of them of external conditions, and we know also that such conditions are chiefly operative in congested urban districts, and therefore, of course, in Central London. What are such conditions? First, there is density of houses per acre, which in Central London averages about 19-20, as compared with 8 houses per acre in London generally, and 5 in Hampstead and 3 in Lewisham; secondly, there is in central districts a greater density of persons per house, that is to say, overcrowding is more marked; thirdly, there is accompanying such conditions a greater degree of "domestic insanitation," owing to degeneration of houses and people; fourthly, the conditions of labour are more unfavourable in congested districts; and, lastly, there is poverty. The more I observe the effect of these five conditions, the more certain am I that their influence upon a death rate is great. And perhaps this is particularly marked in relation to the last point mentioned, poverty, which is directly associated with a higher death rate, a higher infant mortality rate, and a lower physical standard of health than obtain in districts more favourably conditioned. Poverty leads to (*a*) lack of food, not rapid starvation but slow starvation, especially of women, girls, and children; (*b*) unsuitability of food; (*c*) inferior housing accommodation, overcrowding, and domestic insanitation; (*d*) strain and fatigue of continual effort; and (*e*) uncleanliness.

The reduction of a death rate due to these conditions does not depend upon the methods of preventive medicine so much as upon a better and simpler physical and social life which springs from broad common-sense conditions of hygiene.



THE ROYAL COLLEGE OF SURGEONS, EDINBURGH.

1505—1905.

[With Plates VI. and VII.]

JUST four centuries ago, eight years before the disastrous field of Flodden, the worthy craftsmen who shaved and phlebotomized the lieges of the burgh of Edinburgh were anticipating a great event, and, we may imagine, were elated beyond their wont. How far the barber-surgeons were already organised we know not: that they formed a brotherhood with a "Kirkmaister" at their head is alone certain, when they definitely emerge from the obscurity of history on July 1st, 1505, as an incorporated guild of the city of Edinburgh under an Act of the Town Council called a "Seill of Cause." To trace the growth of what was at first but a trades' guild, banded together to defend its rights and maintain its monopoly of cropping and curing the citizens, into the Royal College which is this month celebrating the Quater-centenary of its birth, is the object of these pages.

The Seal of Cause¹ is a quaint document, and some of its provisions are worth quoting. In the preamble the "chirurgeanes and barbouris" place in the fore-front of their plea for incorporation that they "uphald ane altar situat within your College Kirk of Sanct Geill in the honour of God and of Sanct Mongow our Patrone." The privileges granted by the magistrates are those of electing annually a "Kirkmaister or Ourisman," a monopoly of plying the surgeon-barbers' trade in the city, the right to have "ane condemnit man efter he be deid (*absit omen*) to mak anatomea of," and moreover "that na persoun man nor woman within this burgh mak nor sell ony aquavite within the samyn Except the saidis maisteris brether and friemen." Sundry rules as to fees for membership, permission to have, "as utheris crafts hes," an officer to marshal them on Corpus Christi Day, and the right to the aid of a town officer to "poynd or distrenyie" if need arose, are laid

¹ *A Collection of Royal Grants relative to the College, of Surgeons.* Edin., 1818, pp. 1 et seq.

down in the Act, and as pledges that no member should exercise his craft inexpertly, the barber-surgeons promise to take no apprentice "without he can baith ryte and reid," as well as that "every friedman among them be examinitt and previtt. . . . That he know anatomea nature and complexioun of every member In manis bodye And in lykewayes he know all the vaynis of the samyn that he may mak flewbothomea in dew tyme And als that he know in quhilk member the signe hes domination for the tyme for every man aught to know the nature and substance of every thing that he wirkis or ellis he is negligent." With all its tincture of religion and astrology, the first charter of the barber-surgeons is a shrewdly drawn business document, reflecting credit on both parties to the bargain; it was a barrier to practice by unlicensed quacks, and if the tests imposed were not rigorous the words "examinitt and previtt" show that they were not purely formal. The Town Council in granting this monopoly assured a certain standard of surgical skill, and moreover in incorporating the barber-surgeons they secured at their deliberations the presence of the Kirkmaister, who, with the deacons of the other trades,¹ was, and for long remained, *ex officio* a member of the Town Council. The fact that the Surgeons were primarily a civic institution had important bearings on their future, involving as it did an alliance between them and the Magistrates.

For nearly two hundred years the barber-surgeons continued to derive their rights from the Council, and not until 1694 did they emerge from the chrysalis stage of a city guild to burst forth into the splendour of a Royal Corporation, with enhanced dignity and extended privileges. Before we deal with these, however, let us look at the earlier days of the College's history.

Barber-Surgeons (1505-1657).—No minutes exist for the first 76 years,² and our scanty information is gleaned from the city records. The Seal of Cause was confirmed by James IV. in 1506,³ and in 1567 "Marie be the Grace of God Queene of Scottis" issued letters⁴ exempting the surgeon from "bering

¹ e.g., tailors, skinnners, cordiners, hammermen, &c.

² Gairdner: *Historical Sketch of the Royal College of Surgeons*. Edin., 1860, p. 7.

³ *Coll. Grants*, p. 8.

⁴ *Coll. Grants*, p. 11.

of Armour or passing in Battell In all weiris wapenschawingis raidis gaderingis assembleis and armyis And also fra all passing upoun assyssis or Inqueistis in actions criminal or ciuile except safer as appertains to the jugement of thair awin craft." In this Act and hereafter the kirkmaister is described as the "dekin" or deacon. It was the custom to have such charters confirmed by successive sovereigns and parliaments; to enumerate all these ratifications would be superfluous, and only such as throw light on the progress of the Incorporation need be referred to.

It is impossible to trace the steps by which the surgeons separated themselves from the barbers. With the improved status which incorporation gave, presumably the barber surgeons tended to devote themselves chiefly to the more honourable craft. At any rate, by 1589¹ the custom was arising (apparently without any legislative act) of admitting the simple barber "to cow [brush] clip shaife and wesche" but to "use na poynt of chirurgie under the payne of tynsell of his freedome," and in 1591 a minute of the Company declares² that in future candidates who are not "abill and expert to abyde and geif and sufficient examination" are to be restricted to the tonsorial part of their profession, with as a later minute proves, the not inconsiderable privilege of making aqua vitæ. These simple barbers, admitted at a low rate, had no deliberative voice in the incorporation, and were permitted no "signe of chirurgie in their bughts or houses oppenlie or privatlie sic as pigs [crockerie] buistis or chirurgiane caiss." The bonds between the surgeons and barbers speedily relaxed after this, and the former entered into an alliance with a new body, the apothecaries. During the seventeenth century the barbers were mere dependents, and the magistrates in 1682 had to compel the company to ensure that their numbers were adequate to the Town's needs. Not, however, until 1722,³ on the occasion of an action by the barbers, were the two bodies legally disjoined by a decree of the Court of Session,⁴ the Common Council again compensating

¹ *Historical Sketch*, p. 7.

² *Surgeons' Records*, quoted in *Hist. Sketch*, p. 29.

³ Stark, however (*A Picture of Edinburgh*, &c., p. 144), writes in 1819 that the barbers were still obliged to register their apprentices along with those of the surgeons.

⁴ Maitland: *A History of Edinburgh*. Edin., 1753, p. 296.

the barbers for their lost dignity by confirming to them the monopoly of selling aqua vitæ.¹

Surgeon Apothecaries (1657-1697). The relations between the Surgeons and Apothecaries are complicated by the intrusion into the medical world of Edinburgh of the physicians, first as free-lances, then as a Royal College, and to trace succinctly the currents of medical politics of the time is no very easy matter. The invasion of the Surgeon's monopoly by unlicensed practitioners must have assumed some dimensions by 1641, because an Act of Council of that year provides penalties for illegal practice.² Apparently from lack of specification another penal Act was passed in 1643 specially debarring "all apothecars unfriemen chirurgeans and their servands" from practising on pain of a fine of twenty pounds, and this Act is specially interesting in that it defines anew the scope of the surgeon's craft³—"operationis and applicationis . . . upon the liveing and dead⁴ bodies of Men Women and Children and the curing of the diseases . . . as tumouris woundis ulcers luxationis fractures cureing of virolls [*la vérole*] et caetera and their accidents by operationis applicationis dyett Medicaments and what els requisite to the compleit cure." Our friends the barber surgeons had thus enlarged their views of practice very considerably since 1505, when to "mak flewbothomea in dew tyme" was its sum and substance. This definition of surgery receives scathing criticism from a contemporary pamphleteer:⁵ "How ridiculous it is to discharge [debar] all persons whatsoever to cure verols &c. . . . save the surgeons allenarly [only], sure the Council have been no good *Frenchmen*, for if it be the *Verole petite* let them look to their young and sucking children, and if *la grosse Verole* to their Swamper youths, which in sober Scots sounds the Glengore [syphilis]

¹ Christopher Irving, the first who was admitted (December 28, 1658) after the crisis of 1657, was entered as a free chirurgeon; the words "and barber," which occurs in all previous minutes, are not added either then or later. *List of Fellows of the Royal College of Surgeons*, Edin., 1874, p. 14.

² *Coll. Grants*, p. 21.

³ *Coll. Grants*, p. 30. The Act of 1643 is not itself in the collection, but the above passage is quoted from it in the Act of 1655. Cf. the criticism, *infra*, p. 3.

⁴ Refers to the application of cere cloths.

⁵ *Observations on the Act of Council of 1655* (Edin., Ca. 1657), quoted in *A Historical Account of the Rights and Privileges of the Royal College of Physicians*, [by Dr. Will. Eccles, Pres. of the College, Edin.,] 1707. p. 13.

. . . . &c. might comprehend all diseases as well nominate as not nominate it comprehends all medicine." The anonymous writer asserts that the definition was inserted into the preamble only of the Act of 1643, and "subtilly and snakingly" made statutory in 1655¹ "all to gratify the conjobling of a Linsy Winsy Apothecary-Surgeons."

Surgeons and apothecaries, however, soon called a truce, and combined their forces against a more formidable enemy. This is not the place to speak of the rise of the sister College of Physicians; suffice it to say that an attempt by the physicians in 1657 to get a charter infringing² some of the surgeons' rights alarmed the latter (the Patent was on the eve of receiving Cromwell's signature) who forthwith united with the apothecaries under an Act of Council, the terms of which were much the same as those designed to regulate the art of pharmacy which had been inserted by the physicians in their abortive charter.

This Act³ was granted (1657) on the appeal of the apothecaries and surgeon-apothecaries, and provides for the examination of the latter and the supervision of their shops. The wording of the Act is rather ambiguous: its final clause states that it is not intended "to erect [the apothecaries] into a corporation,"⁴ yet throughout the Act both apothecaries and surgeon-apothecaries are repeatedly mentioned. It therefore seems as though by this date the custom of surgeons acting as apothecaries had arisen. But evidently there was no desire to give the simple apothecaries ground for asserting equality with the *ci-devant* barber-surgeons: the apothecaries were to be admitted to practise pharmacy *by the Town Council, after examination by the Surgeons and Surgeon-apothecaries*. Probably by this time the apothecaries had by their attainments gained sufficient informal recognition as a brotherhood to warrant their being entrusted with some degree of self-government. In the Parliamentary ratification of the Act (1697) surgery, represented by the *Incorporation of surgeons and barbers*, and pharmacy, by the *brotherhood of apothecaries*

¹ Cf. note³, p. 108.

² *Report on the Examination of Medical Practitioners*. Printed by the Royal College of Physicians, Edin., 1833, p. 13.

³ *Coll. Grants*, p. 32.

⁴ Cf. Court of Session Decree, *infra*, p. 111.

and surgeon-apothecaries, are spoken of, while the Patent of Incorporation of the College of Surgeons refers to the surgeons and surgeon-apothecaries alone.¹ The original status of the apothecaries is therefore vague, but one fact which clearly emerges is that the barber-surgeons became surgeon-apothecaries by taking up the sale of drugs, not by admitting apothecaries to their ranks. What induced the apothecaries to join the surgeons in defeating the physicians' charter is not stated, but we know that they were the ordinary medical (as opposed to surgical) attendants in those days, and they would therefore dread the advent of a physician with the prestige of a University degree.

At this period the surgeons were a power in the land : their Deacon sat at the city board and wielded no little influence in civic affairs ; further than this, the appointment of the two members of Parliament for the city lay in the hands of the Council, and between the Restoration and the Union the deacon of the surgeons was elected no less than thrice.² Of the first 158 members of the Incorporation nearly twenty owned estates, and many more, houses ; six at least were allied by blood or marriage with the nobility, and six were surgeons to the Kings of Scots.³

A rift soon appeared within the lute of the union of the surgeons and apothecaries. It seems that in the exercise of their new jurisdiction the Corporation acted so summarily as to estrange their associates. Eccles alleges that they were tyrannous : his instances of their oppression are quaint enough to bear repetition, if only to illustrate the dialectics of a bygone day. "Did they not cause *William Adams* a *simple* apothecary to be hurried away by a town *Officer* before a *Baillie* . . . for having applied a *Plaster* to a groom's hand that belonged to the Earl of *Marchmount* ; did they not pursue *James Chisholme* a *simple* apothecary . . . only for taking some Water out of the Belly of a Woman his own Relation that had died of a *Hydropsie*, that she might the more easily be put in her coffin. . . . Did they not by virtue of their

¹ *Coll. Grants*, pp. 39 *et seq.* and 48 *et seq.*

² James Borthwick, 1661 ; Arthur Temple, 1669 ; G. W. Stirling, 1689, *Hist. Sketch*, p. 10.

³ Gairdner : *Early History of the Medical Profession in Edinburgh*. Edin., 1864, p. 14, footnote.

new Patent [that of 1694] send their Commissioners to *Fife* where all the Gardiners and everybody else that could breathe a vein were pursued and fined for blood-letting.”¹ At any rate, there soon began a bitter controversy so complicated that it is now impossible to understand its details “without a labour that would have taxed a Gibbon or a Niebuhr.”² In 1681 a simple apothecary named Patrick Gunningham³ “a sturdy-stomached fellow and almost desperate with their continued oppressions”—raised an action in the Court of Session for reduction of the Act of 1657. In this *cause célèbre* most of the leaders of the Scots Bar appeared, and in effect the decision of the judges was to rescind that part of the Act uniting the surgeons and apothecaries—“these being two distinct employments”—while leaving in force the clauses erecting the apothecaries into a fraternity.⁴ Their point thus gained, the apothecaries’ next step was to petition the Council to appoint one of their number to supervise the sale of drugs in the city and liberties of Edinburgh. To this the Council at first agreed, but the influence of the surgeons at the board made itself felt, and the function of regulating druggists’ shops was, in defiance of the law, again entrusted to the older incorporation. This action of the Council was the subject of a second appeal to the courts, which upheld the apothecaries’ contention, but the same sequence of events took place in each of the four ensuing years, up to 1688 at least.⁵

Were this litigation merely the expression of a petty squabble between the two parties it might have been passed over in silence, but it is momentous in that it proved the immediate precursor of the foundation of the College of Physicians. Thus by a Nemesis of fate the very alliance which had primarily defeated the physicians’ efforts to obtain a charter, was, through its dissolution, a contributor to their success. In determining the relative scope of pharmacy and surgery, the Judges called for advice from the four principal physicians,⁶ and it seems to have been on their

¹ *Rights and Privileges*, p. 14.

² *Report on Examination*, p. 93.

³ *Rights and Privileges*, p. 15.

⁴ *Cf. supra*, p. 109.

⁵ *Rights and Privileges*, pp. 15 *et seq.*; *Report on Examination*, Appendix G, *passim*.

⁶ Hay, Stevenson, Balfour, and Burnet.

evidence that the decision was based.¹ At a meeting of physicians convened by these four to discuss the reference of the Court, Sir Robert Sibbald "downright proposed the establishment of a College"²; how his scheme culminated on St. Andrew's Day, 1681, when the Great Seal was formerly appended to the Charter of the Royal College of Physicians will be related in a future paper. The further stages of the dispute between the surgeons and apothecaries are obscure: probably the physicians had always been the instigators of the latter in contesting the supervision of the surgeons. Be this as it may, in 1695 the College of Physicians formally declared that "quhairas we have now rid marches" with the surgeons, it would no longer oppose the reunion of surgery and pharmacy,³ and in 1697 the Council ratified its Act of forty years earlier, asserting that the disputes which had caused that Act to fail of its purpose had now been removed by an agreement between the physicians and surgeon-apothecaries.⁴ The bonds thus tightened relaxed gradually with altering circumstances, and, without any formal severance from the apothecaries, the art of pharmacy ceased being practised by the surgeons in the earlier years of the nineteenth century.⁵

The Royal College of Surgeons (1695-1905). A year or two before the settlement of the above dispute between the physicians and surgeons, the latter had obtained from William and Mary a Patent⁶ creating them a College; while confirming their rights it protects those of the physicians, and makes the attempt to delimit the fields of medicine and surgery. To the latter appertains the right "curandi omnia vulnerum genera collisiones ossium fracturas et dislocationes tumores ulcera et similia et omnia accidentia quae solius Chirurgae operationum sunt subjectae . . ." while "curam morborum omnium ab origine internorum ad solos Medicos privatim pertinere At vero morbos omnes et languores ab externa causa provenientes et eorum accidentia sive medicamentis

¹ Eccles denies this.

² Peel Ritchie: *Early Days of the Royal College of Physicians*, Edin., 1899, p. 35.

³ *Coll. Grants*, p. 64.

⁴ *Coll. Grants*, p. 66.

⁵ *Hist. Sketch*, p. 10.

⁶ February 2, 1694; Parliamentary ratification, 1695.

PLATE VI.



Fig. 1. *Royal College of Surgeons, Edinburgh.*

PLATE VII.

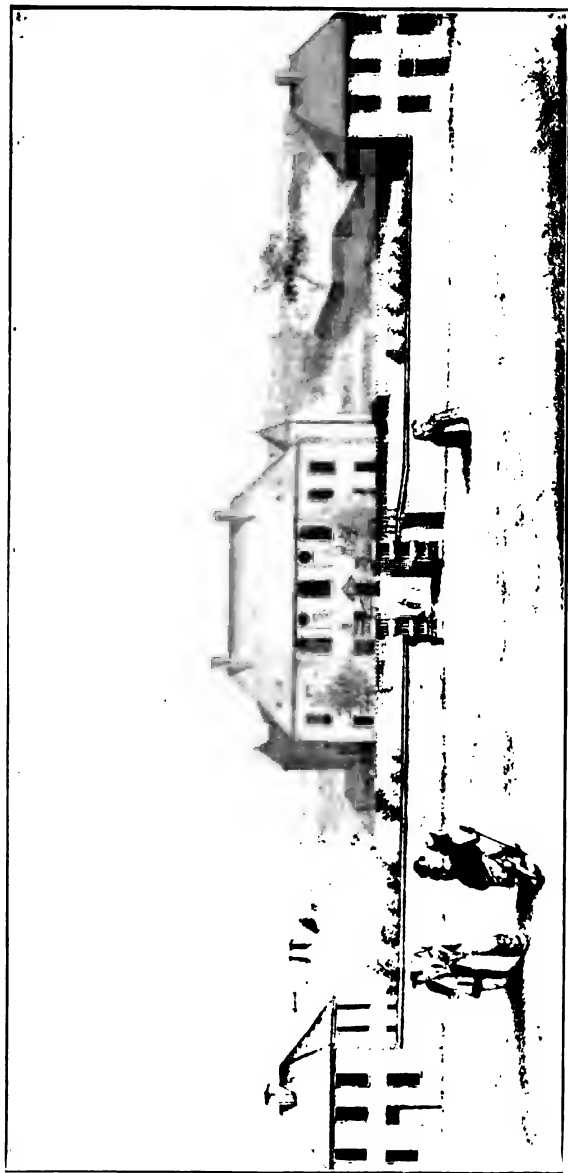


Fig. 2. *The Old Surgeons' Hall.*

interne ministratis externe applicatis curentur . . . ad Chyrgos . . . pertinere."¹ On this the following contemporary criticism seems justifiable: "Why should all diseases from external causes belong solely to the surgeons? A man by catching cold falls in a Decay, by overheating himself or drinking too much falls in a Fever, by a misfortune of a female friend catches a Clap, a Pox, or so, by riding on a rainy day gets a Rheumatism or an Angina . . . why are not all these the adequate subject of chirurgical operation?"² More important practically than this, however, was the extended jurisdiction which the new Patent conferred in empowering the surgeons to supervise the practice of surgery and pharmacy in Fife, Peebles, Selkirk, Roxburgh, Berwick, and the Lothians.

Eccles gives some curious particulars anent the procuring of this Patent. The Surgeons, hearing of the Physicians' Charter, tried to forestall it by obtaining one dated at Newmarket, September 26, 1681, *i.e.*, two months prior to that of the physicians. Some of its clauses certainly make one rub one's eyes, as where after instructing all judges and magistrates to maintain and assist the surgeons, it *discharges them from deciding any action or process of law brought against the Incorporation*. The Privy Council got wind of this, however, and suppressed the attempt to place the surgeons outwith the jurisdiction of the courts. Glimpses of another Patent are caught in the litigation between the surgeons and apothecaries, as the former founded part of their defence on a document dated at Windsor in 1686, wherein the King, by his absolute authority, reunited the two employments, any decree of the Lords of Session notwithstanding. The clause in the Patent of William and Mary saving the rights of the physicians was not, according to Eccles, in the original, but was inserted in the Parliamentary ratification through the influence of the physicians.³

The extended authority granted by the Patent greatly enhanced the prestige of the College; it no doubt also led

¹ *Coll. Grants*, p. 55.

² *Rights and Privileges*, p. 24.

³ *Rights and Privileges*, p. 25; *Report on Examination*, p. 95. The undertaking of the physicians not to oppose the reunion of surgery and pharmacy seems to have been a *quid pro quo*.

indirectly to the rise of the Medical School of Edinburgh by setting up a standard among the practitioners of the district of which the metropolis is the centre. The history of the College during the nineteenth century, therefore, is closely entwined with that of the Medical School, a subject which demands a separate narrative, and can only be alluded to here in saying that about this time the two men who led in founding it—Archibald Pitcairn and Alexander Monro—became members of the College of Surgeons.

We have now traced our barber-surgeons from the stage of a city guild to the dignity of a College by Letters Patent ; it remains shortly to sketch the further evolution by which the bonds of civic alliance, at first beneficial, then irksome, were loosened and finally severed. In 1778 the Surgeons became a Royal College under a Charter of George III., and henceforth those admitted were known as Fellows. By this charter the national position the College had earned was justly recognised, though connection with the city was retained in the shape of the seat in the Council occupied by the President. This right, however, carried a measure of thralldom with it, as the Council could deny the President's chair to any Fellow who was obnoxious to them—a veto actually exercised as late as 1816. Dr. Gillespie, the excluded candidate, was, however, forced upon the Council by the simple expedient of making a leet of those most objectionable to the magistrates, whose powers were restricted to disallowing half the names on it.¹ The Burgh Reform Act of 1833 relieved the College from the obligation of sending its President to the Council-chamber, and left its choice untrammelled, but it still remained a city Incorporation until the Charter of 1851 abrogated all relation with the town and established it upon a national basis. Taking advantage of a clause in the Medical Acts of 1858, the College in the ensuing year combined with the sister College for the purpose of granting a double qualification in medicine and surgery, which was superseded in 1884 by an association of all the Scottish medical corporations for granting the Triple Qualification. Of all the surgeons' duties to the community during these four centuries, none has been more faithfully or

¹ *Hist. Sketch*, p. 23.

more uninterruptedly performed than that of examining and licensing in surgery.

In this purely historical sketch the personality of the men who made the College and their successors has been left untouched: the briefest mention would have made it impossible within reasonable compass to deal adequately with the steps by which the College rose. That it originated the Medical School has been stated: it also played a part in the history of the Royal Infirmary, but of these consideration must be deferred.

Yet to clothe the bare bones of Act and Charter some reference may be allowed to a few of the activities of the barber-surgeons and their successors from the troublous days of the Reformation to the peace of the Victorian Age. In the border forays of the sixteenth century the surgeons bore their part. Of August 16, 1542 we read, "gevin to George Leche, William Quhite, George Fothringham, and David Robertson, surregeanis passand to the Bordour for cureing of all persouns that hapnit to be hurt be the Inglis menne, xii li." In 1558, the Incorporation raised a band of twenty-five of their number "for the defence of the toune against oure auld inemyies of England."¹ It is not surprising that an Edinburgh guild, incorporated in the year John Knox was born, early took steps to exclude Roman Catholics from its midst. This was done by obliging entrants to swear that they would "continue in the Profession of Christ's blessed Evangell as the same is publickly preached in this realm," while the promise to uphold the Altar of St. Mungo was redeemed from all taint of Rome by the saving clause, "except idolatrie."² Sabbath observance, however, as we understand it, was at a discount, as meetings of the brotherhood were often called for Sundays during the century after the Reformation, though at the same period Acts were passed "against barbarizing on the Sabbath." In 1638, the Surgeons signed the Solemn League and Covenant, and ordained "their haill prenteisses and servands to subscryve the same."³

¹ Pitcairn's *Criminal Trials*, quoted in *List of Fellows*, p. 3.

² *Hist. Med. Prof.*, pp. 7, 8.

³ *Hist. Med. Prof.*, p. 11.

The Surgeons' Hospital.—Soon after the inception of the Royal Infirmary, at first familiarly called the "Physicians' Hospital," the surgeons erected a hospital of their own. Where it was situated, and what work it did, the writer has failed to discover. Despite their protests to the contrary, the promoters of the venture seem to have acted partly in emulation of the Infirmary, and partly in the hope that by amalgamating with the latter the staff and College of Surgeons would secure the right of serving the older institution, a privilege which the Managers of the Infirmary had denied to the Corporation as a whole, though they had accepted the services of individual surgeons.¹ The hospital was opened in July 1736 (seven years later than the Infirmary),² and though looked on favourably by the College as a whole, it was apparently a private venture on the part of ten Fellows, who bound themselves to subscribe to its maintenance, and obtained donations from the charitably disposed. Soon after the hospital was opened,³ the surgeon erectors unsuccessfully sought assistance in the medical treatment of their patients from the College of Physicians; and in 1737 they offered to amalgamate with and transfer their services to the Infirmary. At this time the Surgeons' Hospital cannot have attained any great prominence in the city as the Managers of the Infirmary while considering the proposal did not know whether it was *intended to erect* a hospital, or whether the Surgeons "only desired to introduce themselves into the management of the Infirmary."⁴ The matter then dropped until 1738, when the two institutions united, the surgeons gaining the right of acting as surgeons to the Infirmary, subject to the regulation the Managers.⁵ The intentions of the contracting parties are not very clear, and became subject of litigation sixty years later, on the Managers making some changes in the Surgical Department by which the surgeons thought their rights were violated.

¹ The rejection of the offered services of the incorporation, and the acceptance of those of Alex. Monro, "led immediately to the erection of the Surgeons' Hospital." *Petition of R.C.S. against an Inner House Interlocutor*, April 16, 1801, p. 27.

² *Memorial Concerning the Surgeons' Hospital*, Edin., 1737, p. 5.

³ *Report on Examination*, p. 76.

⁴ Minute quoted in *Memorial of Managers of Royal Infirmary* (Bill Chamber, January 28, 1801), p. 10.

⁵ *Ibid.*, pp. 23 *et seq.*

The Buildings of the College.—In their earliest days, the surgeons gathered at their deacon's dwelling; their first permanent meeting place was a house in Dickson's Close, High Street, rented at £40 a year,¹ which was abandoned for the Hall built in 1669. This Hall was situated just within the city wall on ground originally belonging to the Black Friars, but which, having been secularized, ultimately passed into the hands of the University, who sold it to the Surgeons for 3,000 merks Scots. Owing to a contract with the Council, by which in return for the privilege of obtaining subjects for dissection the corporation undertook to provide a theatre for anatomical teaching, a new hall was opened near the old one (in what was thereafter called Surgeons' Square) in 1697. Of the first Hall no traces now remain; the second was utilised in the extension of the Infirmary, and was incorporated in the fabric of that structure in the early part of last century. This necessitated the construction of the present College of Surgeons in Nicholson Street, which was opened in 1832, during the Presidency of Dr. John Gairdner. It is a handsome building in the Grecian style, with a portico and pediment supported by six fluted Ionic columns. Only four years before the Hall was opened the College acquired the anatomical and pathological collections of Dr. John Barclay and Sir Charles Bell; these are now housed in the spacious museum which is the chief pride of the College, and now, through the labours of successive curators, is only second to the museum of the English College.

¹ Grant : *Old and New Edinburgh*, II., 302.



BY-PATHS OF MEDICINE.

PHYSICIANS OF THE RESTORATION.

I.

CHARLES THE SECOND took a far keener interest in natural science than in statecraft, and it is an appropriate coincidence that the year which saw the restoration of the monarchy saw also the birth of the Royal Society. It was a time of upheaval in all departments of thought. William Harvey had just passed away, but men like Glisson, Wharton, Lower, Christopher Wren and Thomas Willis continued to labour in the vineyard of experimental research, and Sydenham taught physicians to study disease at the bedside rather than in the library. This, and nothing else, is what he meant by his famous advice to young Richard Blackmore, who asked him what he should read to gain a knowledge of medicine. "Read," said the English Hippocrates, "*Don Quixote*. It is a very good book; I still read it myself." In other words, "Read whatever you like; you will never learn the art of healing from books." Blackmore's epic poems, which were said by the wits to be

Writ to the rumbling of his chariot wheels,

are forgotten by all but literary ragpickers, and his very name is preserved from oblivion only because it is embalmed in the satires of Dryden and Pope. In his day, however, he was a successful physician, and it would seem that he bettered Sydenham's instruction, for he threw over all the old medical writers, including even the Father of Medicine, declaring that "assiduous digging in the works of the oldest physician is like delving for silver in the mines of Cornwall, which will not recompense the labour and expense." Another story, related by Dr. Payne,¹ shows Sydenham's practical spirit in a less favourable light. When Hans Sloane, afterwards President of the College of Physicians and of the Royal Society, came to London after studying in continental schools, he brought with

¹ Thomas Sydenham. "*Masters of Medicine*" Series. London, 1900.

him a letter of introduction in which he was commended to the benevolent notice of the great English physician as "a ripe scholar, a good botanist, and a skilful anatomist." Sydenham, after reading the letter, said to the young man: "This is all very fine, but it won't do—Anatomy, Botany, nonsense! Sir, I know an old woman in Covent Garden who understands botany better; and as for anatomy, my butcher can dissect a joint full as well. No, young man, all this is stuff—you must go to the bedside; it is there alone you can learn disease."

The personal influence of Charles the Second on the state of the medical profession was considerable. On the one hand to him was due a regulation which debarred any but doctors of medicine of Oxford and Cambridge from admission to the Fellowship of the London College of Physicians. This enactment was doubtless only a part of the general policy of excluding religious nonconformists of all kinds from positions of honour. Neither of the two English Universities had anything that could be called a medical school; hence students had to go abroad in search of knowledge, and many of them graduated at Padua, Leyden, Rheims, Montpellier, and other continental Universities. Formerly, these foreign-made doctors had on their return home been taken by the College to its bosom without difficulty. Under the new order they could be admitted only within the outer gate. As far as the profession itself was concerned, its effect was to make the College a centre of medical scholarship rather than of science.

If, by making an Oxford or Cambridge degree a necessary condition of admission to the inner sanctuary of the College, Charles did something to maintain the dignity of that institution, on the other hand his patronage of quacks of every kind helped to discredit the whole medical profession. He allowed one notorious seller of nostrums for the cure of diseases which were rife in that day of open and unashamed vice, to style himself "Chymical Physician to His Majesty." Whether the King himself entrusted his royal person to the care of this unsavoury practitioner, we cannot say; but the "Chymical Physician" boasts that His Majesty recommended him to several noble persons. Astrologers, herbalists, water casters, midwives, and "wise women" plied their trades

without let or hindrance. There were indeed ordinances against unlicensed healers, and the College of Physicians had power to enforce them, but the quacks found favour in the royal eyes, and the indifference or sympathy of public opinion made the law a dead letter.

Nor was Charles more particular about the moral than he was about the professional character of the doctors to whom he gave his patronage. His favourite physician, Sir Alexander Fraizer, who, according to Munk, attained to a degree of influence with the King perhaps unequalled in the history of the profession, seems to have owed the confidence with which his royal master honoured him at least in some degree to the pliability of his professional conscience. Pepys explains the secret of his influence at Court as follows :—

“Dr. Pierce tells me, when I was wondering that Frazier should order things with the prince in that confident manner, that Frazier is so great with my lady Castlemaine and Stewart, and all the ladies of the Court, in helping them to slip their calves when there is occasion, and with the great men in curing them, that he can do what he pleases with the King in spite of any man ; and upon the same score with the prince—they all having more or less occasion to make use of him.”

Fraizer, who was a Scot by birth, had been with the Royal Family in exile. He is described by Clarendon as “good at his business, otherwise the maddest fool alive.”

Probably to the sceptical mind of Charles it seemed that there was little to choose between the quacks and the physicians. It must be remembered that the medicine of his day was the farrago of learned-sounding rubbish so deservedly satirized by Molière. With the healing art as founded on direct observation of Nature he may have had little opportunity of becoming acquainted, for Sydenham complained that “by the whispering of some he was balked the employment of the Royal Family, though he was before that called among them one of the first physicians.” Around the King’s deathbed were gathered fourteen doctors, who quarrelled over him and tortured him, as Macaulay says, like an Indian at the stake. He was bled ruthlessly, had the actual cautery applied to his head and a noisome extract of human skulls forced down his throat. Could any quacks have used him worse ?

The doctors of Charles the Second's day were described by one of his own physicians—Gideon Harvey—in a booklet, the nature of which may be gathered from its title-page which is as follows :—

The Conclave of Physicians, detecting their Intrigues, Frauds, and Plots, against their Patients. Also Peculiar Discourse of the Jesuits Bark : The History thereof, with its True Use, and Abuse. Moreover, a Narrative of an eminent case in Physick, By Gideon Harvey, M.D., Physician in ordinary to His Majesty. London: Printed by James Partridge at the Post-house between Charing-Cross and Whitehall. MDCLXXXIII.

The picture is a coarse caricature, but a caricature only exaggerates actual features, and therefore often gives a better notion of the original than a serious portrait. The King read the "Conclave of Physicians," and must have laughed at the gibes against the College of which he was the Patron. The author's satire was barbed by a personal grievance, for the College had shut its door in his face. Though an Englishman by descent, Harvey was a Dutchman by birth. He entered at Exter College, Oxford, where he saw something of the practice of the famous Willis, against whom he appears to have nourished a special grudge. He afterwards studied at Leyden and Paris. He settled in London after the Restoration, and was appointed physician to Charles the Second about the year 1675. He was a man of considerable knowledge, but some of his writings, notably certain pamphlets on the "Venereal Evil," brought him into disrepute with his professional brethren. Nevertheless, he had a large practice, and must have had the power of ingratiating himself with influential patrons, for, after having been physician to Charles, he was appointed in the first year of William and Mary "their Majesties physician of the Tower," a lucrative post, which he continued to hold till his death, and in which he was succeeded by his son, Gideon Harvey the younger, who has sometimes been confused with his father.

Harvey assures the reader in his introduction that he wrote his book with "a sincere design of cautioning Physicians and Chyrurgions, in the exercise of their profession, by setting before their Eyes the Errors, Fraud and male practice of some

Physick Doctors of Paris, and those also *sub tecto nomine*, it being wholly foreign to my intention to detract from the reputation of any man though living at a great distance." He protests, and calls Heaven to witness, that he did never declare to any man, nor ever shall, that by Paris Physicians and Chyrurgions he meant any other than those living in the Metropolis of France. He conjectures that "this . . . will be termed a Jesuitical Protestation by some malicious Infidels who will believe none Protestants but those that wear little Bands and crop'd hair." With an inconsistency which can scarcely be called Jesuitical, he tells us that the "Conclave of Physicians" to which he refers is the Conclave of Physicians of Venice and the "Conclave Physicians" Venetians. The reader is to know that "this famous Conclave is the eldest Quack Synagogue, consisting of a Physick Pope or Patriarch, and a competent number of Medicinal Cardinals who, being grown ancient, covetous, and through forgetfulness ignorant, are to govern the rest, and, whenever they are consulted, they are to impose upon the juniors their pretended long Experience which they are to imbrace with the same implicate faith the Turks do their Alcoram." This recalls the famous oath in the graduation ceremony at the end of the *Malade Imaginaire* in which the candidate swears in every consultation to be *ancien avis au bon ou au mauvais*. If refractory the "Juniors" are to be convened before *Il Consiglio piccolo*, which is their Purgatory, whence they may be received again into the bosom of the Conclave; but if afterwards they prove incorrigible, then the Consiglio Grande or the whole Conclave sits upon them (which is their Inquisition), and there they are "damned and utterly expelled without redemption." He adds that "it is in the power of the *Consiglio Piccolo* to grant Indulgences to Nurses, Midwives, Tiukers and Cobblers to practise physick." We are further informed that "the prerogative of granting Bulls of Absolution for Poisoning a man, or Dispensation for male practice is invested in most of the Cardinals, but especially in the Patriarch, and the method of procuring them is easie, viz., by sending for one of them (which in their Gibrish is termed *calling one in*) and operating with the Patient or his relations to present him with three or four Hongari's or Chequeens, which procures a plenary Absolution." The Patriarch is regarded by

the Conclave as infallible, "carrying the Keyes of Life and Death about his Girdle, namely an Inkhorn and an Escroul, on which setting his mark all mankind is implicitly to believe the Patient either died impossibly cureable; or recovered his health at the heads of the Learned."

Naturally unbelievers and heretics are banned. "Against those that refuse being admitted into their Conclave and will not conform, they send forth their Bulls and Anathema's declaring them to be Mountebanks, Quacks, Chymists, Barbers, Ignorants, etc., and if such should at any time have a Patient die under their hands of an incurable Disease, they thunder it out, he killed the Patient, poisoned him, applied wrong Medicines and the like." On the other hand, they are on occasion ready to sell their privileges to any that will buy: "According to the exinanition of their Treasury, once in eight or ten years they proclaim a Jubile, setting open their doors to Physicians, Barbers, Apothecaries and Renegade Priests, who upon the payment of a certain number of Chequeens, are Honoured with a Fop Character, and received into the Church Porch of *Æsculapius*."

They have their festivals and their sacrifices: "Their immolations are celebrated chiefly in the Winter upon Dogs and Cats by the younger fry, and sometimes upon humane bodies performed by the Hangman, their subservient Officer, which being conveyed to their Chauncel, the Cardinals in their turn fall hewing and slaying these Carcases like Cannibals, to the intent all Spectators (to whom at such Festivals free egress and regress is granted) may behold them sitting in their *Pontificalibus*, and making a pretended narrower search into the parts of man's body, insinuating thereby to these gazers their incomparable Skill and Learning, not without a plain Innuendo that they should send for them in time of Sickness."

These extracts from the Introduction will serve to give an idea of the spirit in which the book is written. The body of the work must be left for consideration in a further article.

Practical Notes.

DIARRHŒA.—This is one of those everyday affections, which often occur during the summer and early autumn months. In order that it may be treated rationally, the practitioner must even keep in mind all the more important possible causes which give rise to it. It is convenient to consider diarrhœa under two heads :—(1) *Secondary diarrhœa*, where the affection is mainly symptomatic of some morbid condition, and (2) *Primary diarrhœa*, which is due to some local affection of the mucous membrane of the intestinal wall itself or to abnormal contents.

Secondary diarrhœa may occur under the following conditions :—

1. It may be due to one of the specific infectious diseases, such as enteric fever, cholera, dysentery, pneumonia.

2. It may be associated with local ulceration of the mucous membrane of the intestinal wall, as occurs in chronic tuberculosis, malignant disease of the rectum, and ulcerative colitis.

3. It may be caused by Addison's disease, or one of the profound anæmias or even in chronic Bright's disease and uræmia, when it is due to the elimination of toxic substances by the bowel.

4. It occasionally occurs when the mucous membrane of the intestine is in a state of passive catarrh, which is due to the congestion brought about by atrophic cirrhosis of the liver, or a nutmeg liver, caused by chronic cardiac, or chronic lung affections.

5. It may be due to lardaceous disease of the mucous membrane of the intestine.

Primary diarrhœa is, as a rule, associated with a catarrhal inflammation of the mucous membrane of the small and large intestine, and the more important causes are as follows :—

1. Errors in diet, due mainly to the presence of unripe or decaying fruit, or to that of apple or plum skins, which irritate the mucous membrane of the bowel. This is one of the most frequent causes of diarrhœa in children.

2. Sudden rise in the surrounding temperature, especially the case in July, August, and September, or, on the other hand, it may be due to a sudden chilling of the surface of the body.

3. Local irritants, such as drugs, taken in too large doses, or in small doses over too long a period, such as mercury, arsenic, or similarly food which has decomposed, such as bad milk or certain tinned foods. The Cholera Infantum, which occurs in young children or who have been artificially fed on milk which is infected with various micro-organisms, may be mentioned here.

4. Excessive secretion of bile, absence of bile, or absence of the pancreatic juice from the lumen of the intestine. In the last case the stools may contain undigested fat and muscle fibre.

5. Nervous causes, such as excitement, anxiety, fright, functional conditions, especially in women. These act by causing increased peristaltic movements, and also by increasing the secretion of the glands lining the mucous membrane of the intestine.

It is sometimes useful to be able to distinguish between the cause of the diarrhoea as being a catarrhal inflammation of the small intestine, or of the large intestine. The following points may help in the diagnosis. In cases of catarrhal inflammation of the small intestine, the diarrhoea is less marked, the pain is colicky, there is undigested food in the fæces, which are greenish-yellow, and there is not much mucous present. In catarrhal inflammation of the large intestine, there may be much pain over the ascending, transverse and descending colon, and, as a rule, much mucous occurs in the stools, and there is frequently a good deal of tenesmus.

In treating diarrhoea, it is necessary to keep the patient warm in bed, and the first consideration must be the removal, if possible, of the cause. With this in view, Hydrargyrum c. creta may be given in doses varying from one to three grains, or, perhaps, the safest of all remedies is castor oil, which begins to act in the duodenum, and so clears the bowel throughout. One disadvantage of this, however, is that a child is very apt to vomit it. Still, the Mistura Olei Ricini of the B.P., given in doses of one to two fluid ounces as a draught, is not unpleasant.

The following is a useful mixture, as the astringent action of the rhubarb comes into force after the purgation :—

℞ Pulveris Rhei	-	-	-	-	gr. iv.
Sodii Bicarbonatis	-	-	-	-	gr. x.
Syrupi Zingiberis	-	-	-	-	℥ ss.
Aq. Menth. Pip.	-	-	-	-	ad ʒ j.

Misce. Ft. Mist.

Two tablespoonfuls to be taken three times daily.

If the cause of the diarrhœa cannot be removed, its effects to a large extent may be prevented by the following mixture :—

℞. Bismuthi Subnitratis	-	-	-	gr. xx.
Pulveris Tragacanthæ Co.	-	-	-	gr. xx.
Spiritus Chloroformi	-	-	-	℥ xx.
Aq. Menth. Pip.	-	-	-	ad ʒ j.

Misce. Ft. Mist.

Dr. Burney Yeo recommends the following mixture for adults :—

℞. Bismuthi Oxtychloridi	-	-	-	80 grains.
Pulv. Cretæ Aromatici	-	-	-	160 „
Sodii Bicarbonatis	-	-	-	40 „
Spiritus Ammonia Aromat.	-	-	-	4 drams.
Mucilaginis Tragacanthæ	-	-	-	2 ozs.
Aquæ Chloroformi	-	-	-	2 ozs.
Aq. Cinnam.	-	-	-	ad 8 ozs.

Misce. Ft. Mist.

Two tablespoonfuls to be taken every two or three hours until the diarrhœa stops.

Should the diarrhœa continue after the cause has been removed, constringents and neuro-muscular sedatives to the intestinal wall should be employed, such as Pulvis Kino Compositus, which contains 1 grain of opium in 20, and may be given in 10-grain doses. The following also may be found useful :—

℞. Acidi Sulphurici Diluti	-	-	-	℥ xx.
Tincturæ Opii	-	-	-	℥ vi.
Spiritus Chloroformi	-	-	-	℥ xv.
Aq. Camph.	-	-	-	ad ʒ j.

Misce. Ft. Mist.

Pulvis Cretæ Aromaticus c. *Opio* in 10 to 30 grain doses is a valuable remedy in ordinary cases of slight diarrhoea.

The diet must be carefully regulated. The best food, undoubtedly, is milk diluted with soda-water, or a little arrow-root, sago, tapioca, or ground rice and milk. In the dyspeptic diarrhoeas of artificially-fed infants, Professor Osler recommends the following food :—"The whites of two or three eggs stirred in a pint of water, and a teaspoonful of brandy and a little salt mixed with it." This is both stimulating and nourishing. In very young children *Liquor Calcis* is a valuable remedy. All solids should be withheld, and no hot drinks allowed.

Should the patient be much collapsed, brandy or champagne must be given cold and in small doses. Port wine and water, in small but frequent doses, is also recommended as a beverage.

In cholera infantum, the stomach and large bowel should be irrigated with lukewarm water, and if the collapse is extreme, hypodermic injections of .9 per cent. sodium chloride solution may be used, or even allowed to run into the peritoneal cavity. The effect of this is to keep up the blood pressure of the infant.

THE PHYSIOLOGY OF THE DIGESTIVE PROCESS.—
BILIARY AND PANCREATIC DIGESTION.—Although gastric digestion takes about three hours before it is completed, the pylorus usually opens about twenty minutes after gastric digestion has commenced, this allows a small amount of acid gastric chyme to be poured into the duodenum. The presence of this acid is the normal stimulus for the outpouring of bile and for the secretion of pancreatic juice. After the intestinal contents are neutralised by the alkaline pancreatic juice, more acid chyme is expelled into the duodenum, so more bile and pancreatic juice are secreted. The chief function of the bile now acting upon the acid chyme is to precipitate any proteid which has not been converted into peptone in the stomach. This is then caught by the *valvulæ conniventes*, and its passage through the small intestine is delayed so that it may be completely digested by the proteolytic ferment of the pancreatic juice. Bile aids in the emulsification of fat; it also aids the pancreatic juice in digesting cooked and uncooked starch, and in

some animals it is said to have an amylolytic ferment of its own which is capable of converting starch into maltose. Recent research shows that there is produced in the mucous membrane of the duodenum and jejunum a body which is called *pro-secretin*, and that this, in the presence of the free hydrochloric acid which is present in the acid gastric chyme which is poured into the duodenum or in the presence of free fatty acid, splits off a body called *secretin*. This substance is probably an organic substance of low molecular weight. It is believed that the secretin thus liberated is absorbed from the wall of the intestine and carried round to the pancreas by either the blood or lymph stream, and its action in the pancreas is to directly excite the cells lining the acini of the pancreas so that they pour out their secretion. If *secretin* be injected into the blood stream of an animal it is found that the secretion of bile is much quickened, this will account for the increased flow of bile which occurs within the first few hours after taking food. It will be noticed, therefore, that during digestion there is a series of processes going on, one following the other, and each dependent upon the other, the secretion of acid gastric juice depends to a certain extent upon the presence of the alkaline saliva, and the secretion of bile and pancreatic juice depends upon the presence of acid, which is contained in the acid gastric chyme.

The pancreatic juice is the most important of all the digestive juices. Its proteolytic action depends upon the presence of a ferment called *trypsin*. Absolutely fresh and pure pancreatic juice, however, has no digestive action upon proteid food. It depends upon the presence of the succus entericus for its proper action. Fresh pancreatic juice contains the mother-ferment, *trypsinogen*, and this is transformed into active *trypsin* by the *zymolysin* or *enterokinase* or "ferment of the ferments" which is present in the succus entericus. The trypsin so liberated converts proteid in the presence of an alkali (sodium carbonate) into alkali-albumin, then into albumoses, and finally into peptone. It goes further, however, in its action than the pepsin of the gastric juice, for it converts the peptones into simpler substances as leucine, tyrosine, arginine, aspartic acid, and ammonia. Trypsin does not digest collagen. The starch-splitting ferment of the

pancreatic juice is *amylopsin*, which is capable of digesting both cooked and uncooked starch, converting it into soluble starch or amidulin, subsequently into the dextrins (erythrodextrin and achroödextrin), and finally into maltose ($C_{12}H_{22}O_{11}$). It should be remembered that the pancreatic juice of an infant does not contain any amylopsin, which means that an infant certainly during the first seven months of its life is incapable of digesting any starchy material.

The action of the pancreatic juice upon fats is a two-fold one. It aids the bile in emulsifying the fats, and by virtue of its steapsin, it splits the fats into glycerine and the corresponding fatty acid, for example, tristearin, which occurs in fair quantity in mutton fat, is split into glycerin and stearic acid. Some of the fatty acids combine with the alkaline bases present to form a soluble soap, while others become dissolved in the bile salts and are therefore more readily absorbed. Pancreatic juice also contains a milk-curdling ferment, but this is hardly ever called into play for the milk is normally curdled in the stomach.

In certain circumstances bile and pancreatic juice cannot get into the duodenum because of obstruction to the bile or pancreatic duct, or both. Such obstruction may be brought about by a gall-stone impacted at the common orifice of both ducts, by a pancreatic calculus impacted in the pancreatic duct, by malignant disease of the duodenum involving the common papilla, or in the head of the pancreas, and occasionally by chronic interstitial pancreatitis.

A gastroduodenal catarrh may cause swelling of the mucous membrane of the duodenum to such an extent as to obstruct one or both ducts. Bile is secreted at a comparatively low pressure (15 millimetres of mercury), and any obstruction, involving the main duct, which raises the pressure in that duct, is liable to cause the bile to pass back into the blood-stream (the venous pressure in the portal vein corresponds to 10 millimetres of mercury); obstructive jaundice will result, and both bile salts and bile pigments will be found in the urine. Should no pancreatic juice reach the duodenum, undigested fat and muscle fibre may be found in the fæces.

If 60 grains of salol be given in cachets, in divided doses, during twenty-four hours, carboic acid will appear in the

urine; this is due to the fact that the salol is broken up by the alkaline pancreatic juice in the small intestine. If, however, no pancreatic juice makes its way into the duodenum, the salol remains unchanged, and no carbolic acid can be detected in the urine. The most convenient tests for carbolic acid in the urine are:—(i) Add to the urine which contains the carbolic acid a few drops of *Liquor Ferri Perchloridi*, a violet colour is produced; (ii) Add to the urine a few drops of bromine water, a yellow crystalline precipitate of tri-bromophenol ($C_6H_3Br_3OH$) is produced; (iii) If a small quantity of bleaching-powder and a little ammonia are added to the urine, on heating the mixture, a blue colour is produced; (iv) If Millon's reagent (acid nitrate of mercury) be added, a bright red colour is produced. The importance of this test is obvious, as it enables us to diagnose obstruction to the outpouring of the pancreatic juice into the duodenum.

“**CHOLAGOGUES.**”—Drugs which increase the flow of bile are divided into two classes:—1. Direct cholagogues, which act by stimulating directly the liver cells; and 2. Indirect cholagogues, which clear out the intestinal contents, including the bile, and therefore indirectly stimulate a fresh secretion.

The following are useful direct hepatic stimulants:—

M. Pulveris Rhei	-	-	-	-	gr. v.
Sodii Bicarbonatis	-	-	-	-	gr. v.
Ammonii Carbonatis	-	-	-	-	gr. iii.
Aquæ Menthæ Piperitæ	-	-	-	-	ʒ iii.
Inf. Quass.	-	-	-	-	ad ʒ i.
Misce. Ft. Mist.					
Or R. Sodii Sulphatis	-	-	-	-	ʒ ss.
Sodii Phosphatis	-	-	-	-	ʒ ss.
Inf. Aurant. Co.	-	-	-	-	ad ʒ j.
Misce. Ft. Mist.					

Mercurials are good indirect cholagogues and with this action in view *Pilula Hydrargyri*—“Blue Pill”—in doses of four to eight grains may be given, or *Hydrargyri Subchloridum*—Calomel—in five-grain doses combined with five grains of Bicarbonate of Soda.



Reviews of Books.

NOTES ON NEW EDITIONS.

Atlas of the External Diseases of the Eye, including a brief Treatise on the Pathology and Treatment. By Professor Dr. O. HAAB, of Zürich. Translated from the German. Second edition revised and edited by G. E. DE SCHWEINITZ, A.M., M.D., Professor of Ophthalmology in the University of Pennsylvania. Philadelphia, New York, and London: W. B. Saunders & Co. 8s.

THIS book forms one of Saunders's well-known "Medical Hand-Atlas" series, in which a most successful work by the same author on Ophthalmoscopy has already been published. It consists really of a student's text-book, illustrated with the most realistic coloured plates. An excellent description of the methods of examining the eye in disease is given. The pathology and treatment of the various affections of the lachrymal apparatus, eyelids, eyeball and orbit are described. The colouring and reproduction of the illustrations leave little to be desired. A careful study of them, with the description given in the letterpress of the diseases depicted, would form as good an introduction as a student could have to clinical work on diseases of the eye. As a handy book of reference for the busy general practitioner we can also commend it. The illustrations on Plate 15 of Spring Conjunctivitis are worthy of a special note of praise. The characteristic thickening at the limbus, the tessellated appearance of the flat-topped granulations, and the peculiar milky opacity of the conjunctiva are most beautifully represented. One glance at this plate would teach a student more of the characters of this affection than could be obtained from the reading of any printed description. Dr. De Schweinitz, the editor of the English edition, has here and there enriched the work with valuable little notes of his own, inserted in brackets.

Manual of the Diseases of the Eye for Students and General Practitioners. By CHARLES H. MAY, M.D. London: Bailliere, Tindall & Cox. 8s.

THE third edition of *Manual of Diseases of the Eye* has now appeared, the second edition having been published in 1901. The book is intended primarily for students and general practitioners, and in order to keep it within reasonable limits, the author has taken care to describe fully only those diseases likely to be met with in general practice, while rare conditions are merely mentioned, and those that may be considered as curiosities have been omitted, or at the most just touched upon. On the whole the book is well written and can be thoroughly recommended, and the various diseases are described in a clear and lucid manner.

The Blood: how to examine and diagnose its Diseases. By ALFRED C. COLES, M.D., D.Sc., F.R.S. Edin. London: J. and A. Churchill.

THIS book was first published in 1898 and has now reached its third edition, a fact which speaks volumes for the work. It is pre-eminently a

practical book, and embodies much of the author's own experience and results in this important branch of study. The plates, which are artistic productions, show clearly the points which they are intended to illustrate.

Diseases of the Heart. By EDMUND HENRY COLBECK, M.D., F.R.C.P. London: Henry Kimpton.

THIS is a second and slightly enlarged edition. There is a brief account of mechanical strain of the heart and of the Stokes-Adams' syndrome; while the description of the treatment of chronic valvular disease has been amplified.

Diseases of the Nervous System, a Text-book for Students and Practitioners of Medicine. By H. OPPENHEIM, M.D. London: J. B. Lippincott & Company. 21s. net.

THE volume before us is the second American edition, which has been revised and enlarged by Dr. Edward E. Mayer. It is a valuable addition to the more recent text-books upon neurology, and will be read with pleasure and advantage by the practitioners interested in this branch of medicine. Throughout the work special stress has been laid upon symptomatology, diagnosis, prognosis and treatment. The text is simplified and elucidated by many excellent photographs and illustrations. The volume is a welcome addition to neurological literature.

The Principles and Practice of Gynæcology for Students and Practitioners. By E. C. DUDLEY, A.M., M.D. London: Henry Kimpton. 25s. net.

THE two great features of the fourth edition of this well-known work, which has been revised, are a wealth of diagrammatic illustrations and a number of tables of differential diagnosis. There are more than three hundred new illustrations which have been specially made for the book. There is little mention of the action of drugs outside the usual antiseptic agents. The work is practical throughout and is written with a spirit of enthusiasm for, and confidence in, operative measures when carried out with absolute asepsis. This zeal is supported by vast clinical experience, and tempered by a strict and careful consideration of the result of the operations.

A Practical Treatise of Genito-urinary and Venereal Diseases and Syphilis. By ROBERT W. TAYLOR, A.M., M.D. London: Henry Kimpton. 28s. net.

THE volume before us is the third edition of this work, which has been thoroughly revised and brought up to date. It is profusely illustrated with thirty-nine exceedingly good plates. It is a very valuable and trustworthy work.

The Intestinal Catarrhs, being a clinical Study of Colitis, Appendicitis, and their Allies, with a special new section on Sprue. By EDWARD BLAKE, M.D. London: H. J. Glaisher. 5s.

THIS book, which is the second edition, "gives furiously to think," for the keynote thereof may be set down as "that the treatment of acute gout resolves itself into the treatment of acute colitis." The author adopts and amplifies Professor Woods Hutchinson's view on the relation of gout to intestinal sepsis. A broad view of colitis is therefore necessarily taken, and

a list of nearly eighty diseases given, which include either a general catarrh of the *primæ viæ*, or sequelæ thereto brought about by anti-toxins. The work contains many shrewd practical points and hints, including many "wrinkles" for the general practitioner.

Diseases of the Skin: Their Description, Pathology, Diagnosis, and Treatment.
By RADCLIFFE CROCKER, M.D. (Lond.), F.R.C.P. London: H. K. Lewis.
28s. net.

THIS new edition (third) has been thoroughly revised and brought up to date. Compactness and facility of reference have suffered from its conversion into two volumes with a single index to both, but the original plan of the work, by which the student is able to select the most important features, remains unaltered. The addition of new material enhances the value of the text. Special attention is devoted to the skin eruptions of children, and a large number of prescriptions is appended, features which will be appreciated by all readers, and especially general practitioners.

Treatises on Diseases of the Skin. By Dr. H. W. STELWAGON, Ph.D.
London: W. B. Saunders & Co.

THE fact that this treatise has already taken a foremost place amongst the standard works on dermatology is eloquent testimony in favour of its excellence. It is written chiefly from a clinical and practical standpoint, and aims at presenting the subject in as clear and intelligible a manner as possible. Less space is devoted to pathological anatomy than in the older text-book, and on this account it is better adapted for the student and general practitioner than for the dermatologist. Full reference however, is made to all the most recent literature, with the result that every section presents a strikingly thorough and up-to-date résumé of the subject. The details of treatment are given with care and discrimination, and, in the prescriptions, the doses are expressed in the metric system side by side with the apothecaries' measure. The plates and photographs should be particularly helpful to the student. The high standard of the work generally cannot fail to ensure its success.

Dental Surgery. By A. W. BARRETT, M.B., M.R.C.S., L.D.S.
London: H. K. Lewis.

THIS valuable little book, which has reached a fourth edition, is written especially for general practitioners and medical students. In the present edition, the subjects of dental caries and plastic fillings have been reconsidered. The fact that the work has gone through three editions already speaks for itself.

Manual of Hygiene for Students and Nurses. By Dr. JOHN GLAISTER.
Edinburgh: E. and S. Livingstone. 6s.

THIS second edition of a useful and well-known book has been revised. It contains no marked changes, though it may be noted that chapters have been added, which make the work more complete, and annotations have been interpolated in the text, which increase its usefulness. We commend the work to general practitioners.

The Sanitary Inspector's Handbook. By ALBERT TAYLOR.
London: H. K. Lewis. 6s.

THE general arrangement of the subjects is this, the fourth edition, remains unchanged, although the work has been thoroughly revised and slightly enlarged, with a few additional illustrations. The bylaws of the London County Council, relating to the construction of drains, water-closets, soil pipes and to the depositing of drain pipes, have also been added.

The Principles and Practice of Medical Jurisprudence. By the late ALFRED SWAINE TAYLOR, M.D., F.R.S. London: J. and A. Churchill. 36s. net.

DR. TAYLOR first published his *Manual* in 1843, and out of this, which ran through twelve editions, was developed the "*Principles and Practice*" of *Medical Jurisprudence*, which was first published in 1865. The present edition, which is the fifth, and which consists of two volumes of more than 900 pages each, has been edited, revised, and brought up to date by Dr. Fred. J. Smith, Medical Referee to the Home Office. Much of the older editions has been retained, though many articles have been entirely rewritten, and the whole plan of the work has been re-cast. Reference is made to the "*Infectious Diseases Notification Act*," the "*Workman's Compensation Act*," and the "*Criminal Evidence Act*," all of which have been passed since the fourth edition appeared. We can only add that this standard reference work should be in the hands of all medical men, who are now frequently called to appear in the witness box, from time to time, to give evidence of a more or less technical character. To enhance the value of the work, Dr. Smith has added, at the end of each volume, a complete index, which refers only to that volume.

Wharton and Stillé's Medical Jurisprudence. Vol. II.—*Poisons.* By DR. ROBERT AMORY and DR. ROBERT L. EMERSON. Rochester, N.Y.: The Lawyers' Co-Operative Publishing Company.

ONE of the chief features of this fifth edition is the change in the classification of the groups of poisons. In older works on toxicology, poisons were classified in groups according to their similarity and with regard to the symptoms produced by them. In the present work they are classified in accordance with their chemical and physical relations. The portions of work which relate to chemical research have been revised, while new chapters have been added on ptomain poisoning from food, the detection of blood-stains, and the differentiation of the blood of man from that of lower animals. The work will be found useful to the legal as well as the medical profession.

A Text-book of Physiological Chemistry. By Professor OLOF HAMMARSTEN. New York: John Wiley & Son. London: Chapman and Hall, Ltd.

THE book before us is the fourth American edition, and is an authorised translation from Professor Hammarsten's enlarged and revised fifth German edition, by Dr. John A. Mandel. During the last few years the subject of physiological chemistry has developed so rapidly in importance, and has become so specialised that we welcome an up-to-date edition in the English language of such an important work by one of the greatest of modern physiological chemists. One of the main features of the book consists in the large number of references to the modern literature on the subject which are conveniently placed at the foot of each page.

A Text-book of Physiological Chemistry for Students of Medicine and Physicians.
By CHARLES E. SIMON, M.D. London: J. and A. Churchill.

THE first edition of this book was published in 1901, and within three years a second edition has been called for, a fact which indicates that the book has been found to be useful, especially in America. The second edition has been revised and enlarged, and some of the chapters on metabolism and digestion have been entirely rewritten. At the end of the book are some 48 useful exercises in physiological chemistry.

Text-book of Histology, including the Microscopic Technic. By Dr. PHILIPP STÖHR. Translated from the Tenth German edition, by Dr. EMMA L. BILSTEIN. Edited, with additions, by Dr. ALFRED SCHAPER. London: Rebman, Ltd. 14s. net.

FIVE American editions of this text-book have appeared in a little over seven years, a fact that serves to show that it appeals as strongly, in its English garb, to American readers, as it does in its original form to Germans. No other book of its size covers so much ground. The technical instruction is clear, concise and simple, while the descriptions of the tissues and organs are admirable. It is the combination of description and technic that makes the work so valuable to the junior student. The work should find favour with English students.

Modern Materia Medica and Therapeutics. By A. A. STEVENS, A.M., M.D. Philadelphia, New York, and London: W. B. Saunders & Co.

THE author has not only entirely rewritten the third edition of his book, but he has also arranged it differently from the previous editions. It is divided into two parts. The first, treating of *Materia Medica*, has the drugs arranged in groups according to their predominant pharmacological action. In the second part, called "Applied Therapeutics," we find diseases arranged in the following groups, namely, acute infectious diseases, constitutional diseases, diseases of the blood and ductless glands, diseases of the digestive tract, diseases of the respiratory system, diseases of the circulatory system, diseases of the kidneys, diseases of the nervous system. In order to compensate for the deficiencies of the above arrangement the author has provided a pretty copious index. For English students it will be of very limited service, as it only enumerates the preparations of the United States pharmacopœia.

Practical Nursing. By ISLA STEWART and HERBERT E. CUFF, M.D. Edinburgh and London: William Blackwood & Sons. 5s. net.

A NEW and comprehensive edition of this well-known and valuable book is welcome. As the authors state, "book-work cannot take the place of ward-work," but a good book on nursing is a great help to those who are learning, and is equally helpful to the qualified nurse. This is one of the best books, if not the best, of its kind. It is essentially practical, and gives in minute detail the nurse's duty, dealing with matters such as baths, hot and cold, packs, &c., all of which are carefully described. Reasons too are given for treatment with which a nurse should certainly be acquainted. We strongly recommend this book to all nurses.

Notes by the Way.

The Tobacco Question.

ALL things given to man, or invented by him for his service or delectation, are liable to abuse. One consequence of this is that the faddist, who might otherwise be a mute, inglorious Milton, finds the opportunity of expressing himself. Whatever be the thing abused—whether it be flesh-meat, alcohol, tea, coffee, or tobacco—he denounces it as the root of all evil, with the temper, though without the power, of an angry prophet. If these worthy persons had their way, they would make of human life a wilderness and call it peace. They would set the machinery of Government in motion to prevent a hot and dusty cyclist from having a glass of whiskey and soda, or a schoolboy from smoking a cigarette. And in these days, when the engine of State has to adjust its movement to the throb of the great heart of the people, it is conceivable that they may succeed. There is the example of the United States to show the follies of which legislators, with the fear of the faddist before them, are capable.

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An Anti-Cigarette Crusade.

IN between thirty and forty States of the Union, it is said, the Legislatures have made enactments forbidding the sale of tobacco in any form to boys under sixteen; in some of them the prohibition extends to lads of eighteen, and we believe, in one or two, to young men of twenty. By a law recently passed in the State of Indiana, all persons found with cigarettes or even cigarette papers in their possession, were made liable to heavy fines. The fury of the storm of fanaticism raised may, to some extent, be measured by the fact that business men, who find a sedative for worries in tobacco, have found it politic to conceal the habit as if it were a vice; and that a crusade is being preached to girls to induce them to have nothing to do with cigarette smokers. The "cranks," at any rate, give a fine example of the strenuous life enjoined by Mr. Roosevelt. And what is

the result of their triumph ? Exactly what was to be expected : the boys, who formerly smoked cigarettes, have replaced them by big, black cigars !

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**Parliament and
the Juvenile
Smoker.**

AMONG us, too, this new form of the "smoke abatement" problem has of late been the object of consideration by serious persons. Last year the Physical Deterioration Committee recommended that the juvenile smoker should be put down by Act of Parliament. The Government, wisely in our opinion, showed no inclination to take steps to give effect to any of the recommendations. Dr. Macnamara, therefore, has come forward with a Bill providing that no person shall sell, give, or supply tobacco in any form to, or for the use of, any person under the age of sixteen. Breach of the law is punishable by fine, and in the case of a third conviction, by forfeiture for a period of five years of the licence to sell tobacco. The purpose of the Bill is most praiseworthy, for the evils of habitual smoking by boys are unquestionable. Nevertheless we venture to think that the spirit of the maiden aunt is too manifest in the measure for it to find acceptance with a British House of Commons.

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**Plain Facts about
Tobacco.**

THE present issue of THE PRACTITIONER contains a series of articles on the effects of tobacco in health and disease, contributed by men of acknowledged authority. These may safely be taken as representing the best medical opinion of the day on the subject.

Sir Lauder Brunton holds that smoking in moderation is not injurious to grown-up people, but he says there is a general consensus of opinion that it is very distinctly harmful to growing lads. The cigarette is probably the worst form in which tobacco can be smoked ; this is due to the relatively large amount that can be consumed daily in this way, and to the absorption of the poisonous elements by the pulmonary mucous membrane which takes place when the smoke is inhaled, as is so often the case. Sir Lauder Brunton points out the stimulating effect of tobacco on mental activity, and its

soothing effect in conditions of excitement. To most people it will, doubtless, seem that these effects alone fully justify its use. As to the evil effects of abuse, there can be no difference of opinion, but it is well to remember that there is no common measure of abuse by which the amount of tobacco taken in any given case can be regulated. As Dr. James Taylor shows, susceptibility of the nervous system in different persons varies within limits so wide that no general rule of practice can be formulated. In the articles of Mr. W. G. Spencer, Dr. Lambert Lack, and Dr. Willoughby Lyle will be found a lucid and judicial summing up of the effects of tobacco on the mouth and tongue, the upper air passages and the eyes.

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THE only conclusion that can be drawn from
The Moral. all that is known as to the effects of tobacco
 is that embodied in the words of Bacon in his
 essay on "Regiment of Health": "A Man's owne Observation
 of what he findes Good of and what he findes Hurt of, is the
 best Physicke to preserve Health." The hint conveyed in the
 sentence which follows may, however, profitably be pondered
 by smokers:—"But it is a safer Conclusion to say:—*This
 agreeth not well with me, therefore I will not continue it*: Then
 this: *I finde no offence of this, therefore I may use it.*" This
 seems to us to have a special pertinency to the use of tobacco.

On the whole, when the worst that can be said against tobacco has been said, those of us who have not, to use the words of Dr. Taylor, "the part of the nervous system influenced by the poison still in the sensitive and susceptible condition in which it was in childhood" will be disposed to agree with Calverley:—

"I have a liking old
 For thee, though manifold
 Stories, I know, are told,
 Not to thy credit;

How one or two at most
 Drops make a cat a ghost.

* * * *

How they who use fuses
 All grow by slow degrees
 Brainless as chimpanzees,
 Meagre as lizards.

* * * *

Cats may have had their goose
 Cooked by tobacco juice ;
 Still, why deny its use,
 Thoughtfully taken ? "

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Hospitals and Medical Schools.

THE proposal that the teaching of the subjects which constitute the scientific foundation of medicine should be handed over to certain institutions of university character (to use the phrase of the Committee appointed by the President of King Edward's Hospital Fund for London), has about it the simplicity of a beautiful theory. It is doubtful, however, whether in practice it will be found possible to carry it into effect. Although two or three of the hospitals have already decided to act on the suggestion, it will be difficult to induce all of them to pass a self-denying ordinance which is equivalent to committing the happy dispatch. Moreover, the realisation of this scheme would involve disadvantages which, in the opinion of some competent authorities, would more than counterbalance its possible advantages. Sir Frederick Treves, for instance, has declared that medical schools attached to hospitals are of incalculable importance, first to the hospital patient, and secondly to the outside paying patient who gains all the benefit of their teaching. There is much force too in Mr. Henry Morris's contention that, if the prestige given to a hospital by its association with a famous school is taken away, its character and importance will suffer. Students go to a school, not because of the hospital, but because of the traditions and renown of the school. The hospitals have gained largely by their affiliation with the schools without having had to pay a single farthing in return. Sir Isambard Owen has estimated that the existence of the school virtually adds fifty thousand a year to the charitable resources of London. A probable result of the centralization of scientific teaching will be that the total cost of medical education will be materially raised. It is clear too that, if it becomes more costly, the profession will be closed to all but persons of considerable means, and as such persons for the most part prefer occupations which yield a better financial return, the number of properly trained medical practitioners will greatly

decrease. It is not the rich who will suffer from the want of medical skill, but the poor. The problem is one of the greatest importance to the public, and it is not easy at present to see in what direction a satisfactory solution is to be found.

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**Professor
Schweninger and
the Surgeons.**

THE newspapers have taken Professor Schweninger's attack on the surgeons too seriously. This is because they fail to make allowance for the personal equation. He is reported to have said: "The physician has had to give way before the more fortunate surgeon whose success is more quickly evident, and we must to-day quietly look on while frenzy celebrates triumph, where mechanism of the briefest and most generalising inference takes possession of superstitious spirits." The learned professor's phraseology has something of oracular obscurity about it but his meaning is clear enough. The medical profession which can estimate his utterances at their real value treats them as of no importance. Professor Schweninger's only title to fame is that Prince Bismarck gave the case of his health into his keeping. To show his gratitude and possibly to gratify his spite against the profession of which his most formidable enemy, Virchow, was the leader, Bismarck made Dr. Schweninger professor notwithstanding the protests of the Medical Faculty of Berlin. Since the death of his patron Professor Schweninger has become more and more of a medical Ishmael, and has several times held up scientific medicine to public scorn. His latest indictment has not even the merit of originality. More than twenty-five years ago Verneuil raised his voice against what he called *furor secandi* which, in his opinion, prevailed at that time. As the surgeon's knife has enlarged its sphere of beneficent conquest operations have become more frequent; for this sufferers from many diseases which only a few years ago were past all surgery have reason to be thankful. It would be idle to deny that operations are sometimes done for which there is no real justification. This, however, is more often due to an error of judgment than to mere delight in art for art's sake, and in any case it is quite exceptional. One of the advantages

of a medical school with a hospital is that every detail of treatment is carried out in a fierce light of publicity which makes any serious abuse impossible. Medical students are the most critical of spectators, and if, in a given case, their loyalty to a popular chief should make them disposed to close their eyes to an excess of zeal in operating, the surgeon's colleagues may well be trusted to check his exuberant activity.

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**The Plague of
Noise.**

A DISTINGUISHED American visitor who was asked by an interviewer what had struck him most about London, said it was the silence of the streets. This reply will appear surprising to many Londoners and suggests strange reflections as to the condition of the streets of American cities. If the inhabitants of New York and Chicago live and move and have their being in the midst of a din and turmoil that make London seem by comparison silent, it is easy to understand why Cousin Jonathan so often becomes the prey of neurosis. To persons of sensitive ear London is as full of noises as Prospero's Island. In the main arteries of traffic the noise of omnibuses, trams, vans, and vehicles of all kinds; the whistling and yelling of boys; the exchange of amenities between drivers and conductors; the hoarse cries of the men on fire-engines; the shrieks of the demons calling out "Winnahs!", and the hideous snorts and whirrings of motors, make up a concourse of ear-splitting sounds that seem to shatter the nervous system of the exhausted brain-worker. The human ear, like other parts of the body, is singularly adaptable, and it is this quality alone that saves us from deafness, and perhaps worse things. It is easier to indicate the evil than to suggest a remedy. The universal adoption of wood pavements would do something, but these have other drawbacks of their own. Policemen might also be instructed to enforce some remorse and mitigation of voice on newspaper boys and others who shriek in the streets. It is, however, to be feared that noise is one of the inseparable conditions of modern town life, and that all that can be done is to abate an evil which cannot be suppressed.

* * * * *

**Napoleon's
Heart.**

IN an article entitled Royal Relics which appeared in THE PRACTITIONER for May, it was stated that the heart of the great Napoleon was put aside at the *post-mortem* examination of his body and could not afterwards be found. It was added that one suggested explanation of its disappearance was that it had been eaten by rats. In regard to this matter we have received from Dr. A. R. Simpson, the distinguished professor of Midwifery and Diseases of Women in the University of Edinburgh, a letter in which he says :—

“Apropos of the reference to the rats and Napoleon’s heart in the interesting article on Royal Relics, Dr. Aitken who made the P.M. took the heart into his bedroom and put it in his basin among water. He had an idea that Bertrand or some of the Napoleonic entourage would come in search of it and lay down with a loaded pistol at hand. He was awakened in the night time by hearing a splashing at the basin, and jumped up to find some rats trying to get at it. But they didn’t eat it.”

Professor Simpson adds the following curious detail :—

“Dr. Aitken presented the table at which Napoleon dined to our University. It has on the surface a depression which marks the spot on which he placed a pastille that he used to burn after his dinner.”

* * * *

Competitions.

THE result of the May competitions is as follows :—The best essay was sent in by Mr. Norman G. Harry, M.B., of Evesham. The best answers to the three questions were written by Dr. Leonard Joseph Kidd, Stratford Place, W. Cheques have accordingly been sent to these gentlemen.



Novelties and Notices.

"KUMA."

(Cosmo Chemical Company, Ltd., 62, Farringdon Street, E.C.)

The importance of keeping the mouth as clean and aseptic as possible cannot be too strongly insisted upon, for many diseases are traceable to septic teeth. We have examined "Kuma," the preparation before us, and find that it is a really good antiseptic mouth wash, not too strong, and very pleasant to use. It appears to have no deleterious effect on artificial stoppings in teeth—an objection raised to some mouth washes—and it is certainly worthy of a trial by the profession. When used for brushing the teeth, or as a mouth wash, 15 to 25 drops should be added to a wine glass of water, and the mouth rinsed with the mixture.

CASOID MEAL BISCUITS : SUGARLESS JAM.

(Messrs. Callard & Co., 74, Regent Street, London.)

Messrs. Callard & Co. have forwarded to us a tin box containing Casoid Meal Biscuits. These are guaranteed to be absolutely free from starch and sugar, and may, therefore, be readily prescribed in cases of diabetes and obesity, as well as in other diseases. The flavour of these biscuits is not unpleasant. They are easily masticated, and no unpleasant fibrous material is present in the mouth, as is so often the case with cheaper articles. We have also received a specimen of sugarless jam, which is not distasteful to the palate, and is quite suitable for the diabetic. The absence of sugar seems to accentuate the flavour of the fruit used.

EUDRENINE.

(Messrs. Parke, Davis & Co., 111, Queen Victoria Street, E.C.)

Each cubic centimetre of Eudrenine represents $\frac{1}{4}$ grain of Beta-eucaine hydrochloride and $\frac{1}{1000}$ grain of adrenalin chloride. The preparation may be conveniently used as a local anæsthetic and hæmostatic, both for ordinary dental purposes and for minor surgical operations. For dental use it is recommended

COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the June Competitions will be announced in the August number.

a.—The Subject of the Essay for July will be

The Art of Medical Cross-Examination so as to elicit the greatest amount of information in the fewest possible words.

b.—Answers to the following questions are invited :—

1. What are the varieties of whitlow ?
2. What are the causes of right hemianopia ?
3. What are the complications and sequelæ which arise in a case of enteric fever which call for surgical interference ?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner " Essay," and must be sent to the Editor of *THE PRACTITIONER*, 149, Strand, W.C., on or before the 1st day of August, 1905. No Essay must contain more than three thousand words, and the Editor reserves the right to publish any Essay which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner " Questions," and must be sent to the Editor on or before the 1st day of August, 1905.

- A and B.—(1) One side of the paper only must be written on.
(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.
(3) The decision of the Editor is final.
(4) Competitors must be registered General Practitioners.
(5) The attached Coupon must be filled up by each competitor.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

THE PRACTITIONER.

AUGUST, 1905.

PATHOLOGICAL VARIATIONS OF PHYSIOLOGICAL VASOMOTOR ACTION, WITH SPECIAL REFERENCE TO THE MALARIAL PAROXYSMAL NEUROSES.

By FRANCIS HARE, M.D.,

*Late Consulting Physician, Brisbane General Hospital ; Visiting Physician, Diamantina
Hospital for Chronic Diseases ; Inspector-General of Hospitals, Queensland.*

It is generally admitted that pathology is disordered physiology, and that the one graduates into the other. And yet there is a wide chasm between them. For this, physiology has been blamed. It is contended that physiology, though of medical parentage, has issued a declaration of independence against medicine, and thrown itself into the arms of the exact sciences, physics and chemistry.¹ But may there not be faults on both sides ? Is it not true that medicine, so long dominated by exclusively inductive doctrines, has consistently refused to study pathological problems from the physiological, that is, the deductive standpoint ? This can hardly be denied. Yet all things should be studied from all standpoints. The inductive standpoint throws into bold relief the antagonisms or points of dissemblance between the various manifestations which we term diseases ; and that is much but not all that we require. For natural classification, we require to take equal notice of the affinities or points of resemblance between the various so-called diseases ; and here nothing will render such material aid as a comprehensive survey from the deductive standpoint. It is worth considering whether a study of pathology from the physiological side, combined with a study of physiology from the pathological side, would not go far to bridge over the chasm now existing between these two branches of human biology.

¹ See an article entitled "The Domain of Physiology and Its Relations to Medicine," by S. J. Meltzer, *American Medicine*, October 29, 1904, p. 755.

Much work has been done on the physiology of the circulation. Generalising a part of this work, Leonard Hill says :—"The maintenance of a mean arterial pressure of constant height is the object of the circulatory mechanism. On the one hand, we are convinced that this object is attained during life ; on the other hand, we know that countless and ceaseless variations are occurring in all parts of the circulatory system. The system must therefore be so craftily built, and so delicately balanced, that every variation in one part is compensated by a simultaneous and contrary variation in another part, and thus, throughout the wear and tear of life, the aortic pressure is kept at a constant mean height. In other words, the vasomotor system is always in operation, bringing about variations in the supply of arterial blood, in accordance with the continual variations in functional activity of the different organs and tissues ; and generally vaso-constriction and vaso-dilation are in such accurate balance that the general or aortic blood-pressure remains constant.

But the balance may be less accurate. There may be a preponderance of vaso-constriction or a preponderance of vaso-dilation. In the former case there will be a tendency to a rise of general blood pressure ; in the latter, a tendency to a fall. In either case, variations in the action of the heart will largely anticipate the tendency to blood-pressure variation. Leonard Hill says :—"If all the cardiac nerves be intact, a rise of arterial pressure always slows the heart, and a fall accelerates it." This physiological fact was first recognised by Marey.

In a series of articles¹ I have sought to apply these physiological principles to the well-known paroxysmal neuroses, migraine, asthma, angina pectoris, and major epilepsy, and have attempted to show, at least in some cases, (1) that vasomotor action is essential, not incidental ; (2) that vaso-constriction occurs and is usually primary ; and (3) that the phenomena, peculiar to each neurosis, are determined for the most part by the correlative vascular or cardiac condition, whether this consists of vaso-dilation, or of inhibition of the heart-beat, or of both.

Thus in migraine, asthma, and angina there is commonly

¹ "The Mechanism of the Paroxysmal Neuroses," *Australasian Medical Gazette*, July, August, September, and October, 1903.

widespread vaso-constriction usually most marked in the cutaneous area. In migraine, vaso-dilation occurs in some cranial area, and the resulting vascular distension is responsible for the headache and for the occasional occurrence of epistaxis (Tissot¹), sudden choroidal hæmorrhage (Liveing²), "ecchymoses at the seat of the most intense pain" (Gowers³) and in the conjunctivæ (Labarraque⁴), fatal apoplexy (Hilton Fagge⁵), increased ocular tension (Lauder Brunton⁶) amounting in rare instances to acute double glaucoma.⁷ In asthma, vaso-dilation affects the bronchial area, and the resulting vascular distension is responsible for the dyspnœa and for the hæmoptysis which, Hyde Salter points out, may occur as "an accompaniment of the asthmatic paroxysms and in quantity proportionate to the intensity of the dyspnœa."⁸ In angina, vaso-dilation affects the cardiac area (the coronaries, probably often the cardiac plexus), and the resulting vascular distension is responsible for the local and radiating pain, in some degree for the disordered cardiac action, and probably in some cases for the ultimate development of atheromatous and aneurysmal⁹ disease of the coronary arteries. In some cases of major epilepsy, the vaso-constriction presumably occurs so rapidly, or so extensively, as to leave no time or room for adequate compensatory vaso-dilation, and there is demanded consequently cardiac inhibition through the pneumogastric. The resulting cerebral anæmia is responsible for the sudden unconsciousness and for the succeeding tonic and clonic convulsions.

The physiological and clinical evidence in support of the vasomotor mechanism of the four named paroxysmal neuroses has been detailed in the series of articles referred to. It is too large to be considered in this paper. The suggested mechanism has been provisionally accepted somewhat widely in the case of migraine and asthma, especially, it is significant to note, by medical sufferers from these complaints. The same is true, in a less degree, of the rarer disorder angina. But hitherto only a few have given in their adhesion to the mechanism suggested

¹ *Megrim and Sick Headache*, Liveing, 1873, p. 325.

² *Ibid.*, p. 328.

³ *Dis. Ner. Sys.*, 1893, Vol. II., p. 844.

⁴ *Megrim and Sick Headache*, Liveing, 1873, p. 325.

⁵ *Textbook of Medicine*, 1891, Vol. I., p. 784.

⁶ *Headache*, by Harry Campbell, 1894, p. 180.

⁷ *Brit. Med. Journal*, Epitome, March 24, 1900.

⁸ *On Asthma*, 1868, p. 371.

⁹ Morison, in the *Lancet*, November 8, 1902, p. 1248.

for some cases of major epilepsy. (Those few, however, have been long cognisant of these views, and have studied the question from this standpoint.) Nevertheless it seems to me that the evidence adduced in the case of major epilepsy is more extensive and complete, and therefore more cogent, than in the case of the other three paroxysmal neuroses.

The primarily vasomotor theory enables us to understand the interrelations of the paroxysmal neuroses—the fact, long recognised, that any of these affections may replace, or be replaced by, any other. It enables us to understand also the inverse relationships of the paroxysmal neuroses with other diseases. Perhaps, more clearly than all, however, it enables us to understand the *malarial paroxysmal neuroses*.

The most conspicuous manifestation of malaria is the *rigor*. In rigor there is admittedly intense vaso-constriction of the cutaneous area, and the radial artery is tightened up. But the blood-pressure may not be appreciably raised. Broadbent says that “the actual pressure within the vessel is not very great, and the wave can be extinguished without much difficulty.”¹ Here a very pertinent suggestion by Harry Campbell may be recalled:—“Whenever, with radial hypertonus and a sound heart, the radial pressure is low, we should suspect hypotonus of some large vascular area.”² In the case of rigor, the hypotonic or dilated vascular area is not far to seek. It seems certain that this area is the muscular layer of the body which is of course functionally active at the time. Lauder Brunton “considers that the arterioles of the muscles . . . are so large that the blood is able to escape into the veins as rapidly as through the vessels of the splanchnic and skin areas together.”³ And an even moderate dilation of such an area would suffice to prevent a serious rise of blood pressure from extensive cutaneous vaso-constriction.

Thus in rigor, vascular conditions obtain similar to those of migraine. In both there is extensive cutaneous vaso-constriction, compensated by an internal area of vaso-dilation, though this latter varies in location. It is not surprising, therefore, that in some circumstances the malarial poison should give rise to all the typical phenomena of migraine. MacCulloch⁴ described a

¹ *The Pulse*, 1890, p. 189.

² *Lancet*, March 21, 1903, p. 836.

³ Oliphant Nicholson: *Lancet*, April 11, 1903, p. 1056.

⁴ *Textbook of Medicine*, Hilton Fagge, 1891, Vol. I., p. 782.

malarial migraine "hemicranialis intermittens," and referred especially to a case of "double tertian ague, in which the headache and the ague fit occurred regularly on alternate days" throughout the whole of one relapse. In all probability migraine in such cases is a mere modification of rigor, but the factors responsible for the modification remain unknown. This view receives strong support from the existence of cases like the following, which demonstrates that migrainous paroxysms may be associated with rigors, which do not depend upon malarial but upon other kinds of poisoning. The patient was an habitual sufferer from migraine and contracted puerperal pyæmia : during the fever, migrainous attacks, indistinguishable from those from which she had long suffered, recurred with increased frequency ; but they coincided with, and were limited to, the times of the irregularly recurring rigors of the septic pyrexia (communicated by Dr C. S. Hawkes). It is easy to conceive that the vaso-dilation compensatory of the cutaneous vaso-constriction of rapidly raising temperature might, in such cases, fall in part into its "long accustomed groove" and so occasion headache in addition to rigor. Indeed, headache is a frequent associate of malarial rigor ; and, in non-malarial migraine, the cutaneous anæmia is sometimes excessive, and rigor, with or without pyrexia, may ensue.

Asthma may depend upon malaria. Norman Chevers refers to "malarious spasmodic asthma."¹ Theodore Williams says² :—"Malaria plays an important part occasionally in the production of asthma." Charles Morehead describes the case of a Hindoo drummer, who had, for about eight months, attacks of intermittent fever and asthma, which were liable to return at intervals of about 15 days. The paroxysms of fever and dyspnœa recurred together at night and ceased in the morning. He was treated with quinine and iron only. Both paroxysms became less on the second, ceasing on the third day. The author adds³ :—"To determine the probability of a previous malarial influence by inquiry into the history of the case and the condition of the spleen, constitutes an important part of the examination of asthmatic patients in India. If there be good

¹ *Med. Times and Gazette*, 1884, Vol. I., p. 75, *et seq.*

² *Ibid.*

³ *Clinical Researches on Disease in India*, 1860, p. 55.

reason for suspecting it, quinine and iron are indicated, and a more favourable prognosis than in asthma, in other circumstances, provided the emphysema is not great, may be entertained." I am informed that malarial asthma is recognised in the United States, and that, as was to be expected, it is especially common in the early autumn when malaria generally is most rife.

Angina pectoris also may depend upon malaria. Broadbent says¹:—"A perfectly characteristic attack of angina has been described to me as having occurred in intermittent fever, and serious weakness of the heart was left behind for some time." And Anstie says²:—"Another occasional excitant of angina is an interesting link in the chain of proof that angina is *au fond* a neuralgia, namely, the malarial poison which has, in a good many well-observed cases, distinctly induced the disease." The latter author refers to several original and quoted cases in Handfield Jones's *Functional Nervous Diseases*, second edition, 1870. Clearly such anginal seizures may be regarded as modifications of the malarial rigor, the chief modification consisting in the localisation of the vaso-dilation.

There is a well-marked *malarial epilepsy*. Hobart Amory Hare refers to cases mentioned by Jacobi, Payne, and Hamilton, and avers that such occur occasionally in the Southern States and in Brazil. "In Hamilton's case a young man, who had lived for many years in an exceedingly malarious region, had more or less periodic epileptic attacks, attended with great preliminary rise of temperature and intense congestion of the face and head . . . Change of the place of habitation and the use of quinine removed the disease entirely."³ We may imagine that the intense cutaneous vaso-constriction, associated with ague paroxysms, may, in some circumstances, develop so rapidly and widely as to preclude adequate compensation by the muscular vaso-dilation of rigor, and so lead to vagus inhibition of the heart. This view is, I think, fully recognised by Broadbent, who points out that the arterial spasm, associated with the cold stage of malarial fevers, may be carried to such a degree as to bring the heart

¹ Lumleian Lecture, 1891, *Brit. Med. Journ.*, p. 748.

² *Neuralgia and its Counterparts*, 1871, p. 74.

³ *Epilepsy: its Pathology and Treatment*, 1890, p. 92.

to a standstill, and so occasion fatal syncope or serious nervous complications.¹

Malarial infection may lead to grave results in pre-existing epilepsy. Fourteen such cases were investigated by Maraudon de Montyel.² In some, epilepsy long in abeyance revived, in others, epilepsy appeared for the first time after infection. For the most part the fits and the rigors alternated.

On the other hand, some authorities have been so struck with the salutary influence of an intercurrent pyrexia upon pre-existing epilepsy, that they have suggested the deliberate induction of some of the specific fevers in such cases. If this procedure is justifiable, (and I should myself be loth to maintain the contrary) then, in the selection of a pyrexia, we should be careful to exclude all such as are apt to be associated with rigor, or even marked vaso-constriction, during the initial stages.

The view that some epileptic attacks differ from rigors mainly in the nature of the compensation for the extensive vaso-constriction common to both, provides us with a definite conception of the nature of the long-observed relationship between convulsions and rigor. Trousseau pointed out that some children suffered from convulsions at the onset of a fever which would be marked in others, or in adults, by rigor; indeed, his keen clinical insight led him to regard rigor as convulsions minus the cerebral phenomena. The view adopted explains the absence of cerebral phenomena from rigor: muscular vaso-dilation anticipates cardiac inhibition: thus the occurrence of rigor prevents (in a strict sense) the occurrence of convulsions. Nor is it difficult to understand why children, in whom nervous action of all kinds is notoriously precipitate, should suffer in greater proportion than adults from convulsions at the onset of pyrexia.

If we accept the suggested mechanism for some cases of migraine, asthma, angina, and major epilepsy, then we shall almost inevitably be driven to extend this vasomotor conception over a much wider territory.

Many forms of *neuralgia*, trigeminal and other, can be explained by priority of vasomotor action. In these affections

¹ *The Pulse*, 1890, p. 153.

² *Rev. de Méd.*, December 10, 1899, referred to in *Medical Annual*, 1901, p. 373.

there is apt to be vaso-constriction, more or less widely generalised, associated with a vaso-dilation, more or less localised at the seat of pain; and the resulting vascular distension affecting nerve ganglia, nerve trunks, or the immediate neighbourhood of nerve trunks, situated amongst inextensible tissues, would fully account for the neuralgic pain, and for all the phenomena of the well-known painful and tender points of Valleix.

The generalised vaso-constriction was long since demonstrated sphygmographically by Anstie;¹ and the localised vaso-dilation was noted by the same observer.²

The existence of *malarial neuralgia* does not require to be substantiated. All such neuralgias may be regarded as modifications of the malarial rigor. Conformably, Dr. Labbé points out³ that "malarial neuralgia has a particular evolution. . . . It does not appear as a simple complication, added to the ordinary symptoms of malarial infection, but acts as a substitute for these symptoms and replaces the attack of fever." Often the rigors disappear from the day on which facial neuralgia appears. During the attacks "the affected side of the face becomes red and hot and covered with sweat. The eye becomes closed, congested, and filled with tears, and the slightest touch on the face causes severe pain." In such cases the vaso-dilation, substitutive of the muscular vaso-dilation of rigor, is conspicuous. The common cutaneous vaso-constriction is often equally conspicuous. Of two cases of malarial neuralgia, Anstie says⁴ :—"A semi-algide condition always ushered in the attacks"; coincidently "there was unilateral flushing of the face and congestion of the conjunctivæ to a slight degree"; later, the semi-algide condition "was gradually exchanged . . . for a condition in which the pulse was . . . compressible," and "the pain became duller and more diffused contemporaneously with the lowering of the arterial pressure." The gradual subsidence of the peripheral vaso-constriction would of course relieve the vascular distension of the painful area. An exactly parallel succession of changes occurs in the malarial rigor. At the height of the rigor, the cutaneous vaso-constriction is

¹ *Neuralgia and its Counterparts*, 1871, pp. 10, 11.

² *Ibid.*, Chap. 11.

³ *Journal des Praticiens*, February 9, 1901, quoted in *Med. Rev.* May, 1901, p. 291.

⁴ *Neuralgia and its Counterparts*, 1871, p. 19.

extreme, and the radial is highly constricted. As the vascular distension of the muscular area is relieved by the extension of the vaso-dilation to the skin, the radial becomes softer, and the rigor gradually subsides.

Gastralgia may be regarded as a neuralgia of the stomach. There is intense cutaneous vaso-constriction. Clifford Allbutt called attention to the "ashen cold face and blue nails"¹ associated with attacks. The compensatory internal vaso-dilation in some cases certainly trenches on the gastric mucosa. For attacks not rarely end in violent hæmatemesis: the stomach has been opened on several occasions and numerous oozing points discovered.² Further an extremely important case has recently occurred, in which sharp epigastric pain lasted one or two days. The stomach was washed out and the returning fluid was blood-stained and contained a large piece of tissue. "Microscopic examination showed that it was a piece of gastric mucous membrane. There was great oedema of the interstitial tissue: the lymph spaces and vessels were enormously dilated, the cells of the stroma were separated by wide spaces or vacuoles, and the fibres in many cases were separated into their ultimate fibrillæ."³ The case is classed as one of angio-neurotic oedema, for there were associated areas of vascular distension in many other localities; but the difference between painful angio-neurotic oedema of the gastric mucosa, and gastralgia from vascular distension is one of terms only.

Frederick Roberts says of gastralgia:⁴ "Occasionally it results from the action of malaria."

Raynaud's disease is commonly regarded as a vasomotor neurosis. As shown by Raynaud himself, there is a generalised vaso-constriction of the surface; this is greatly intensified in certain parts of the extremities, the distribution of the intensified vaso-constriction varying with the individual case. That there is a compensatory internal vaso-dilation is of course highly probable a priori; and such seems assured a posteriori by the frequent concurrence, with the attacks, of various "idiopathic" hæmorrhages. The diversity of these hæmorrhages suggests that the area of vaso-dilation varies widely. Thus epistaxis is

¹ "Neuroses of the Viscera," *Lancet*, 1884, Vol. I., p. 512.

² Mayo Robson in *Lancet*, December 13, 1902, p. 1627.

³ *Lancet*, December 24, 1904, p. 1802.

⁴ *Theory and Practice of Medicine*, 1883, p. 578.

common, while hæmorrhage from the gums and into the skin and subcutaneous tissue, hæmaturia, hæmoptysis, and cerebral hæmorrhage have all occurred.¹ Further evidence of compensatory vaso-dilation is perhaps afforded by the occurrence, in Raynaud's disease, of attacks of migrainous headache,² angina pectoris,³ asthma,⁴ gastralgia,⁵ polyuria,⁶ and urticaria.⁷ But vaso-dilation may seemingly be absent or inadequate for compensation. In this event, vagus inhibition of the heart-beat might occur as a substitutive compensation; and Boas records a case in which extreme cold led to "epileptoid phenomena."⁸

Raynaud's disease may depend on malaria. In one case "it seemed to Calmette that the attack of arterial spasm in the extremities, occurring as it did daily between 2 and 2.30 p.m., replaced the ordinary febrile attack"⁹; in another, the attacks of fever coincided with attacks of local asphyxia, which did not occur except at that time.¹⁰

Recurrent temporary amblyopia is almost certainly a vasomotor affection. It also may depend upon malaria. Munro points out, on the authority of Gowers, that "Ramorius (1877) has recorded cases of malarial poisoning complicated with paroxysmal amblyopia and narrowing of the retinal vessels, the fundus in the intervals being normal."¹¹

Erythromelalgia is a vasomotor affection. Savill points out that it belongs essentially to the same category as Raynaud's disease; and erythromelalgia, also, may depend on malaria. Professor A. Cavazzani and Dr. Bracci describe a case, and refer to the preceding malarial affection with enlargement of the spleen and the curative influence of quinine.¹²

Urticaria is admittedly due to localised dilation of certain cutaneous arterioles; and this dermatosis also may depend upon malaria. Dr. George Papakosta describes the case of a Greek sergeant of infantry, aged 26, in whom general urticaria appeared and disappeared concurrently with the malarial paroxysms. Examination of the blood showed that the plasmodia of Laveran were present.¹³

¹ *Raynaud's Disease*, T. K. Munro, 1899, pp. 126, 127.

² *Ibid.*, p. 153.

³ *Ibid.*, p. 130.

⁴ *Ibid.*, p. 129.

⁵ *Ibid.*, p. 136.

⁶ *Ibid.*, p. 137.

⁷ *Ibid.*, p. 147.

⁸ *Ibid.*, p. 147.

⁹ *Ibid.*, p. 49.

¹⁰ *Ibid.*, p. 50.

¹¹ *Medical Ophthalmoscopy*, Gowers, 1890, p. 287.

¹² *Il Morgagni*, January, 1900, p. 30, quoted in *Medical Review*.

¹³ *Lancet*, January 9, 1904, p. 92.

The malarial rigor and all the modifications of the malarial rigor considered in this paper, namely, malarial migraine, asthma, angina, major epilepsy, neuralgia, gastralgia, Raynaud's disease, recurrent temporary amblyopia, erythromelalgia, and urticaria, are essentially of vasomotor mechanism. The same is true of the pyæmic migraine referred to, and of the general convulsions, which, in some children, mark the invasion stage of some of the specific fevers. And there can be little doubt that, in all these cases, the pathological vasomotor action depends more or less directly upon the pathological condition of the blood, associated with the different infections; in general terms, all these paroxysmal neuroses are fundamentally humoral in origin. But it is certain that the great majority of paroxysmal neuroses are quite independent of malarial, septic, or other specific infection. Are the great majority then non-humoral in origin? Does each depend upon its own peculiar humoral factors? Or is there some *common humoral factor* which, under the influence of different personal and environing factors, leads to different vasomotor manifestations in different cases? The last of these views is strongly suggested by the analogy of the malarial paroxysmal neuroses. In their case, there is no question that a common humoral factor leads to widely different and varying vasomotor manifestations; and it may be that there exists a still commoner humoral factor, which possesses even wider pathological potentialities than the malarial poison. On a future occasion, I hope to be afforded an opportunity of bringing evidence in support of a humoral factor of such a nature.



INTESTINAL OBSTRUCTION AFTER PELVIC OPERATIONS, PARTICULARLY AFTER SUPRAVAGINAL HYSTERECTOMY.

BY EDRED M. CORNER, B.Sc. (LOND.), M.A., M.B., B.C. (CANTAB.),
F.R.C.S. (ENG.),

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I.

IN December 1904, Dr. Walter Tate brought three cases before the Obstetrical Society,¹ in which intestinal obstruction had arisen from the adhesion of a coil of small bowel to the intraperitoneal cicatrix, left by an operation for fibroids of uterus. The obstruction began two, eight, and three days respectively after the operation. That the onset of this serious complication took place during the convalescence is an important feature; since had it occurred later, the cases would in all probability have been brought to the notice of a general surgeon, and not have returned to the gynaecologist. The cases which are recorded in my paper show this; the trouble, for which they sought advice, not being of obviously pelvic origin, they did not return to the original operator. The subject of this complication of pelvic surgery is one of which the gynaecologist cannot have full knowledge and appreciation. As it has been my fortune to operate on several of these cases, it seemed that I could not respond to your Editor's invitation better than by drawing attention to the subject from the point of view of the general surgeon, and supplementing Dr. Tate's valuable communication.

Pelvic operations are much more frequently followed by intestinal obstruction than are other abdominal procedures. It should be pointed out that intestinal obstruction, due to adhesions to the peritoneal cicatrix, is meant; not that due to adhesions which have resulted from disease. Appendicitis is the chief source of the trouble amongst examples of the latter category. It is a remarkable thing how rarely surgical

¹ *Obstetric Transactions*, XLVI., 1904, pp. 391-403; *Discussion*, pp. 403-410.

operations are followed by this complication. Whilst it is a striking fact that several examples, consequent on gynæcological procedures, should have come under the notice of one man. In order to obtain a wider, and therefore more correct and liberal view of the subject, the frequency with which operations were performed on the ovaries and appendages and the uterus, abdominally or vaginally, was ascertained. The figures are taken from the *St. Thomas's Hospital Reports* for the last six years.

Four hundred and nine operations were done on the ovaries and uterine appendages, 95 abdominal hysterectomies, and 80 vaginal hysterectomies.

The proportion of operations on to the ovaries and tubes to supravaginal or vaginal hysterectomy is about 4 or 5 to 1. During the years 1900-1901-1902 I kept a careful record of all the acute abdominal cases which were admitted, and can therefore say that the cases of post-operative intestinal obstruction did not show anything like this proportion.¹ The operation, which stood pre-eminent amongst all others in causing this complication, was supravaginal hysterectomy; the number of cases standing to the discredit of which was absolutely greater than that of either of the other classes of pelvic operation, instead of being in the proportion of 1 to 4 or 1 to 1 respectively. From this there can be no doubt that the nature of the operation of supravaginal hysterectomy is a factor in the causation of the obstruction.

Further, one would like to point out that intestinal obstruction is only an outward and clinical manifestation of the internal pathological condition. It must be remembered that adhesions can be present without the clinical signs of intestinal obstruction. It is extremely difficult to correlate any clinical sign with the presence of a few adhesions of the small intestines. "Trouble with the bowels" is certainly no symptom. Realising that adhesions may be present without any sign or symptom whatever, the most frequent clinical manifestation may be said to be attacks of localised abdominal pain often associated with vomiting. The occurrence of such attacks after an abdominal operation, and especially after a

¹ *Clinical and Pathological Observations on Acute Abdominal Disease*, p. 12. Constable & Co.

pelvic one, should raise the question of the advisability of exploration. The intestinal obstruction usually results from the intestine forming a kink, or better, a volvulus, using the uppermost adhesion for a fixed point on which to rotate. The cause of this volvulus, in far the majority of cases, is an increase of pressure within the bowel, produced by gas formation, meteorism. The origin of the meteorism is to be found in some error in the diet or the digestion. Sometimes, strong peristalsis draws out the adhesion into the form of a band, under which a coil of small intestine may be ensnared. Meteorism produces a volvulus in almost every obstructed loop. These adhesions antedate the obstruction, showing that the latter is merely a complication, and raising the suspicion that, for every case in which this does occur, the probability is, that there are many in which it does not occur. Two cases will be reported which show the existence of adhesions without the occurrence of intestinal obstruction.

CASE OF FÆCAL FISTULA AFTER A SUPRAVAGINAL HYSTERECTOMY.

A single woman, of about 60 years of age, was seen in 1904 at the Wood Green Hospital with Drs. Ransome and Tipping. She had undergone a supravaginal hysterectomy some months before at the Royal Free Hospital. The abdominal cicatrix was soundly healed excepting at one place, where a fæcal fistula existed. On examination, a probe could be passed a long way into the fistulous tract, and a finger in the vagina revealed the presence of its end on the stump of the amputated uterus. There had been no injury to the bowel at the operation, and the fistula in all probability had arisen from a coil of small intestine becoming adherent to the amputation stump, a stitch in which had ulcerated its way into the bowel. This patient had exhibited no signs of obstruction. The fistula was obviously connected with the small bowel.

CASE OF ATTACKS OF ABDOMINAL PAIN AFTER CURETTING-EXPLORATION.

A woman of 25 years of age was seen at the Wood Green Hospital with Dr. Ransome and Dr. Slater Jones. A few

months previously, she had the interior of her uterus curetted at one of the large London hospitals. Shortly afterwards, she began to suffer from attacks of abdominal trouble which resembled appendicitis, except that the pain was more on the left side than on the right. The abdomen was explored in March 1905, and a few adhesions of the small intestine to the back of the upper part of the uterus were found. There was no trace of disease about the tubes or ovaries, and the woman had never borne a child. It is extremely unusual to find adhesions to the back part of a healthy uterus in a healthy pelvis. The appendix was removed and found to be normal. The cause of the adhesions must be looked for in the curretting when the uterine wall must have been actually or "practically" perforated. Such injuries are very uncommon, so that their complications must be extremely rare. The case is quoted as exhibiting intestinal obstruction after a minor gynæcological operation, with attacks of abdominal pain, accompanied by vomiting and not by pyrexia.

These cases are examples of adhesions after pelvic operations, the presence of which was not shown by acute obstruction. They confirm the suspicion that adhesions are much more common than we have any clinical reason to suppose.

The two following cases are quoted, very briefly, to show what is not meant, namely, intestinal obstruction due to results of the disease, and not the consequence of the operation, although in both a pelvic operation had been performed.

INTESTINAL OBSTRUCTION AFTER VAGINAL HYSTERECTOMY.

J. N., aged 41, had her uterus removed for carcinoma by the vaginal route in April 1902, at Charing Cross Hospital. Intestinal obstruction began on September 10, 1902. She was admitted to St. Thomas's Hospital and operated on, on the 15th. Death followed about the 22nd. At the post-mortem examination, it was found that the obstructing adhesions were attached to secondary carcinomatous glands; the original operation scar being free.

INTESTINAL OBSTRUCTION AFTER AN OVARIOTOMY.

E. L., aged 35, had had an ovarian cyst removed from the left side eight years previously by Dr. Cullingworth. She was

admitted March 19, 1901, suffering from intestinal obstruction of 24 hours' duration, being at the time three months pregnant. At the operation, the obstructing band, which ran from small bowel to mesentery, was found to have ensnared some small gut. The ovariectomy stump was perfect. Recovery was followed by delivery of living child at full term.

In neither of these, was the intestinal obstruction connected with the operation.

The two following cases, are examples of intestinal obstruction caused by adhesions which were the direct consequence of the operation of supravaginal hysterectomy.

INTESTINAL OBSTRUCTION CAUSED BY ADHESIONS TO THE STUMP LEFT AFTER A SUPRAVAGINAL HYSTERECTOMY.

E. R., aged 44, a cook by occupation, was admitted to St. Thomas's Hospital, January 1902. A year previously she had undergone a supravaginal hysterectomy for fibromyomata of the uterus. The operation was most successful. For eight months afterwards she improved continuously. At that date, September 1901, she had a severe attack of abdominal pain, accompanied by vomiting and inaction of the bowels. This subsided, after it had lasted forty-eight hours.

On admission, January 1902, she was suffering from another attack of obstruction, which had lasted four days. The abdomen was much distended, and she complained of severe paroxysmal pains. Vomiting incessant; bowels inactive; tongue thickly covered with brownish-white fur; temperature, 100; pulse rate, 120. Enemata yielded no result of fæces or flatus.

Operation.—An incision was made through the lower part of the right rectus. There was a large amount of free fluid present in the abdominal cavity. The cæcum was collapsed, and the small intestine distended. About a foot from the cæcum, the ileum was densely adherent to the stump of the amputated uterus, the gut was kinked in one or two places. The distended coils had formed a volvulus about the highest adhesion for a fixed point, so rendering the chronic obstruction acute. The adhesions were ligatured and divided. The omentum, which was adherent also, was freed. The pelvis was filled with warm saline solution, and the abdomen closed. The patient's condition during the operation was very bad,

necessitating an hypodermic injection of 5 minims of strychnine and 15 of brandy.

Recovering from the shock of the operation, the temperature rose to 99·8, returning to normal. After a dose of castor oil, the bowels were open on the third day. The wound healed excellently. For some months she reported herself as very well, but slightly constipated, as her habit had always been.

INTESTINAL OBSTRUCTION BY ADHESION OF THE ILEUM TO THE STUMP OF A SUPRAVAGINAL HYSTERECTOMY.

L. T. G., aged 33, single. In October 1904, a supravaginal hysterectomy was performed successfully, after which she returned to her work in nine weeks' time. On January 28, 1905, she was suddenly seized with abdominal pain, followed by vomiting. The paroxysms gradually became more intense. The bowels had given no trouble at all before this attack.

On admission the abdomen was a little tender, and during the paroxysms of pain, which recurred every 10 or 15 minutes, some visible peristalsis appeared under the right rectus muscle.

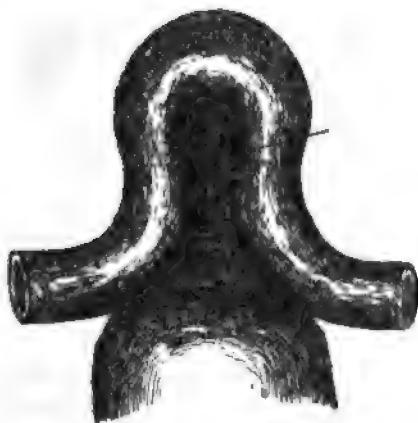


Fig. 1. A. Showing the ileum adherent to the uterus; the adhesion being broad and not contracted as in Fig. 1. B.

Vaginal examination revealed nothing. Temperature, 98°; pulse rate, 116.

Operation.—The abdomen was opened in the middle line, through the old scar. A piece of ileum was adherent in two

places to the stump of the uterus. With these adhesions for a fixed point, the bowel, becoming distended, had kinked and formed a volvulus. The distal of the two adhesions formed a band an inch long, causing partial intestinal obstruction, but a coil of small intestine had passed under it, and, becoming distended with gas, had twisted on its own axis. The proximal adhesion was by far the most interesting. It was broader, and had originally been still broader (Fig. 1. A) before the inflammatory tissue in the adhesion had contracted. By its contraction it had formed a spur (Fig. 1. B), which nearly

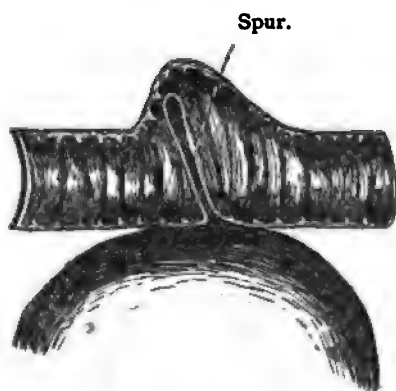


Fig. 1. B. *The bowel is opened to show the spur formed by the contraction of the adhesion in A.*

occluded the lumen of the bowel. The adhesions were divided, and the abdomen sewn up. The bowels were open on the second day after operation, and the rest of the convalescence was uninterrupted.

A study of the above cases shows that adhesions are more frequent, and more frequently give rise to obstruction after supravaginal hysterectomy, than any operation on the uterine appendages or ovaries, or after vaginal hysterectomy or pan-hysterectomy. The presence of this uterine stump amongst the small intestines undoubtedly disposes them to become adherent. How this adhesion takes place is not quite clear. The very occasional sloughing of the flaps is due to sepsis, which cases need not be considered. Perhaps the most favoured suggestion is that the row of sutures and knots offers

the opportunity for the bowel to adhere. Having opened a number of abdomens after an operation, a favourable opportunity has been given to observe such stitches. The sutures are tied firmly, if not tightly. In consequence, the tissues within their grasp are lessened in bulk, fluids being squeezed out of them. There is a tendency for every stitch to lie in a groove of its own making. (Fig. 2. B.) The fluids which have

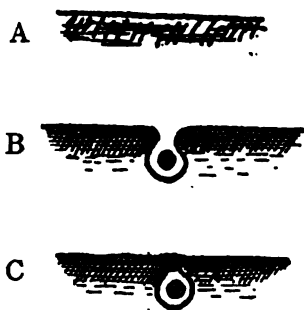


Fig. 2. A. Surface of tissue before a suture is introduced. B. The suture has been tied firmly, and lies in a groove. C. The groove in which the stitch lies has been converted into a canal by lymph resulting from the inflammatory reaction caused by the stitch.

been expressed in tying the ligature will swell the bulk of the contiguous tissues. The slight injury, thus inflicted, calls forth a reparative inflammatory reaction, augmented later by the irritative action of the aseptic stitch, causes a small effusion of lymph, which forms a roof to the groove in which the stitch lies, converting it into a canal. (Fig. 2. C.) Thus in a very few hours all the stitches are buried, being concealed and sheeted over by adhesions, as securely and surely as the appendix is found to be on occasion.

It has been my good fortune to be able to observe these changes whilst operating for post-operative obstruction, hæmorrhage, peritonitis, &c. The whole secret of the successful burying of the sutures and knots is to obtain this localised secretion of lymph. The best way to do so is to cut the flaps with some muscular tissue in them, so that, when the sutures are tied, they are buried in grooves. In a very few hours they are sealed off.

That the stump should be sealed off quickly is important, because stitches, even when tied in the so-called loose manner, in the course of a short time become still looser. Then, in the case of the uterine stump, the peritoneal edges will gape, and the formation of adhesions with the intestines invited. More than this, the flaps and cross-section of the uterus consist of divided muscular tissue, the cut surface of which will ooze; any separation of the edges allowing a leakage into the peritoneal cavity or on to the surface of the peritoneal cicatrix. Mr. Ewen Stabb¹ has made an important observation on this point. He ruptured a spleen artificially in two places. One was closed with deep sutures, and the other with Lembert sutures. On testing these stitches, "no escape occurred from the site of approximation with deep stitches, but the water flowed between the Lembert stitches on full distension." From this it would appear that Lembert stitches will leak more quickly and easily than deep stitches. The latter make

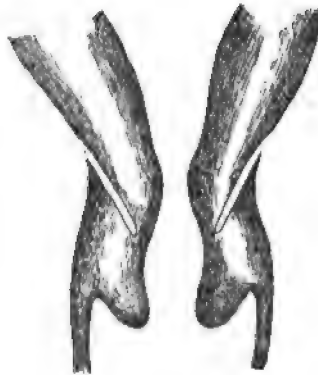


Fig. 3. *Diagram of the flaps cut for a supravaginal amputation of the uterus before any retraction has taken place.*

it difficult to approximate the edges of the flaps perfectly, and it may be suggested that the best method of suturing a uterine stump consists of deep stitches, with intermediate ones, taking up little more than peritoneum, in between.

There is a point of considerable nicety in the fashioning of the sero-muscular flaps for the amputation stump. The

¹ *Clinical Soc. Trans.*, 1896, p. 98.

difficulty is produced by at least two factors. Firstly, in the contraction and retraction of the muscle in the flaps themselves, which leads to their thickening and eversion ; secondly, when the body of the uterus is separated from the cervix, the latter contracts and retracts, becoming shorter and thicker in the process. (Fig. 4.) The shortening of the flaps, with the

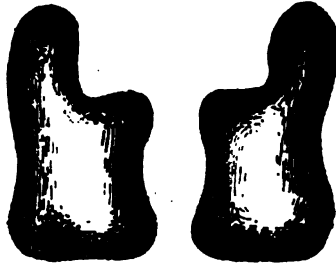


Fig. 4. *Stump after supravaginal amputation of the uterus, showing thickening and shortening of both cervix and flaps.*

broadening of the stump, which is to be covered by them, constitutes the most important practical point in the production of the post-operative adhesions. When there is any difficulty in covering the stump, the stitches have to be tied with tension in order to make the flaps meet. These stitches will be loosened in a few hours, whilst the mere cohesion of the flaps, which has had time to take place, is quite insufficient to prevent them gaping, and hence adhesions with the small intestine are formed. *The tightness with which a suture is tied is to be sufficient to sink the thread in a groove in the stump. It must not be tight in order to bring inadequate flaps together.*

The earliest amputations of limbs were done by means of a transverse cross-section of the limb at the point selected for the site of the operation. If one reads the discussion, which followed Dr. Tate's paper, it will be seen that this mediæval procedure is still practised in supravaginal amputation of the uterus. At a later date, flaps were used to cover the stump. Originally, the flaps were of equal lengths ; in modern times, they are cut unequal. Mr. Bland Sutton, in his excellent *Essays on Hysterectomy*, does not use the word equal, calling the flaps "similar." If the current of surgical opinion

is followed, unequal flaps may be cut for a supravaginal hysterectomy with advantage. A long posterior flap is the one which is the most useful. It covers the cervical stump of the amputated uterus, a continuous suture fixes it to the bottom of the utero-vesical pouch, at the same time anteverting the stump, so that it covers and protects the line of stitching from the intestines, preventing them from becoming adherent. (Fig. 5.) The employment of this long posterior flap is an

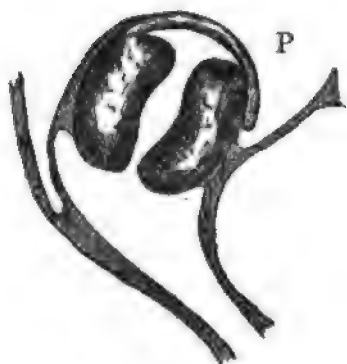


Fig. 5. *Diagram of uterine stump after a supravaginal hysterectomy, covered by a long posterior flap, P.*

alternative to pan-hysterectomy, suggested by Dr. Tate, in order to obviate the formation of adhesions after the amputation of the uterus.

Messrs Jacobson and Steward¹ recommend the use of an anterior flap, adding that "a small peritoneal flap may be raised on the posterior surface of the uterus, but this is not necessary, and may quite well be dispensed with." This anterior flap is more easily cut, but far less easily and accurately sutured than the posterior. Moreover, lying exposed in the pelvis, any little inaccuracy invites the formation of adhesions with the small intestines. The balance of advantage, from the patient's point of view, lies with the posterior flap.

The object of this paper has been to enunciate two propositions; firstly, that the small intestines are only too prone to become adherent to the uterine stump, left after supravaginal

¹ *The Operations of Surgery*, II., p. 556. Edition 1902.

hysterectomy ; and, secondly, that the reasons for this are to be found in the nature and technique of the operation as it is usually performed. Finally, from the consideration of these propositions, it has been suggested that there are means of obviating these occurrences, particularly by the use of a long posterior flap.

In conclusion, part of a letter from Dr. Muzio Williams must be quoted in reference to a case more than three years after an operation for intestinal obstruction, and more than four after a supravaginal hysterectomy. "She has never since been able to do any work. She cannot do anything involving any lifting, because of the abdominal pain it causes. She cannot sit any length of time because of abdominal discomfort. She is more or less of an invalid, and suffers from abdominal pain and nausea, though she is not actually sick." There could scarcely be a more eloquent appeal for a careful reconsideration of the scope and technique of the operation of supravaginal hysterectomy than this description of a woman who has to work for her livelihood.



ŒDEMA OF THE FEET AND LEGS DUE TO THE EXCESSIVE INGESTION OF SODIUM CHLORIDE.

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DURING the last three years, particular attention has been paid to the investigation of the relation between dropsy and the retention of chlorides in the tissues, many valuable observations having been recorded by Widal and Javal and other French writers.

It has been shown in a definite manner that the question of chloride ingestion and retention has a very important influence on the production of anasarca. It has also been demonstrated that in health an excessive ingestion of chlorides may lead to an increase in the weight of the body, as a result of the tissues retaining more fluid than under normal conditions.

The following case, which recently came under my notice, takes us a step further, and demonstrates the fact that the taking of an excessive amount of chloride by a healthy individual may not only lead to retention of fluid in the tissues and a consequent increase in weight, but may be followed by well-marked œdema of the lower extremities.

The patient is a medical man, aged 40, who consulted me on account of œdema of his feet and legs. He had always led a healthy active life. He had been abroad a good deal, but had never suffered from malaria, rheumatism, or any other serious disease. For many years, however, he had been troubled with varicose veins in his legs, but none of them have ever been thrombosed, and, until quite recently, he had not noticed any swelling and œdema of his feet and legs. At the time he first observed the œdema he also complained of a feeling of heaviness in his legs and slight weakness.

Being alarmed on account of these symptoms, and, having visions in his mind of cardiac or renal disease, he came to see me for an opinion as to the cause of the œdema.

I examined him very carefully but failed to find any sign of

organic disease to account for the trouble. The pulse was 80, regular, and of normal tension. The cardiac impulse was in its natural position and the heart-sounds were normal. The liver and spleen were not enlarged, the kidneys were not palpable and there was no ascites.

The knee-jerks were normal, and so were the plantar reflexes. There was no tenderness of either muscles or nerves.

The superficial veins of the legs were enlarged and somewhat varicose. There was no evidence of thrombosis of the femoral or iliac veins.

The inguinal glands were not enlarged.

The urine was of a natural colour, it was slightly acid, and it contained neither albumen nor sugar. The specific gravity was 1028.

Thus, not finding any cause for the marked œdema of his feet and legs, and remembering the importance which has been attached of late to the ingestion and retention of chlorides in relation to anasarca, I questioned him as to diet, and was astonished to find what an enormous quantity of salt he was accustomed to take with his meals. He admitted even taking salt with bacon and salt fish, and stated that it was no unusual occurrence for him to empty the salt-cellar both at luncheon and at dinner. I calculated that on an average he was taking from 300 to 600 grains of salt a day instead of the average 150 grains. That he was taking an excessive amount of salt was proved by the analysis of his urine, which was found to contain 1·86 per cent. of chlorides, *i.e.*, nearly three times the normal amount.

I advised him to decrease, at once, his daily amount of sodium chloride. This he did, but when I saw him about a week after, he said he had become so accustomed to taking large quantities of salt with his meals, that he was no longer able to enjoy his food, and, that in consequence, he had been obliged to entirely reorganise his diet by substituting sweets and pastry for meat and fish. The salt was so necessary an adjunct to the enjoyment of his food that he stated he would willingly give up tobacco, sugar and alcohol, but that salt he must have. He, however, agreed to cut it down as much as possible. At the end of a week, there was an appreciable

decrease in the amount of œdema, and after three weeks it had almost disappeared.

Another urinary analysis was made at this time, and it was found that the sodium chloride had dropped to .98 per cent.

I have no doubt the œdema of the legs was due to the enormous chloride ingestion and consequent excessive retention in the tissues, through the inability of the kidneys to deal adequately with such large quantities.

Widal and Javal found that, in cases of interstitial nephritis, doses of sodium chloride up to 150 grains did not give rise to œdema, but, in cases of parenchymatous nephritis, the result was different, œdema being produced. They found that the chlorides were not excreted entirely, and that, as a result of their retention, the fluid in the tissues was retained. They further showed that, by increasing the amount of chlorides in the diet, the œdema increased, but, on the other hand, if the ingestion of chlorides was diminished the tissues were drawn upon for their reserve chlorides, and, as they were used up, the œdema disappeared. They also demonstrated that there was a definite relation between the hydration of the body and chloride retention, by changing three men suddenly from a diet rich in chlorides to one almost devoid of chlorides, the result being a marked reduction of the body weight of four or five pounds. Unfortunately, I did not weigh my patient before and after the change in his diet, and so can express no definite opinion as to its effect on his body weight. He himself was under the impression that he had lost weight as a result of the treatment.


This case exemplifies the great importance of investigating and regulating the diet with regard to the chloride ingestion in cases of dropsy, not only from the point of view of treatment, but also of diagnosis. I have not been able to find a similar case recorded of a patient seeking advice for œdema of the legs, which proved to be due to an excess of sodium chloride in the diet.

The belief expressed by Widal and Javal, that the elimination of chlorides by the kidneys is a specialised function of these organs, offers the best explanation of the occurrence of œdema of the legs in this case. It might be presumed that, for a considerable time, the kidneys had been able to

deal with the excessive amount of chlorides presented to them for elimination, but it is equally reasonable to suppose that, sooner or later, there would be a limit to this overwork, followed by a breakdown if persisted in, and that it was a failure of this specialised function to continue at high pressure which led to an abnormal retention of chlorides in the tissues, and thus to the production of dropsy.

The chloride estimations were carried out for me by Mr. E. M. Lobb, to whom I am much indebted, in the Physiological Department at Guy's Hospital.

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ON DIFFUSE CARCINOMA OF THE STOMACH, ILLUSTRATED BY TWO EXTREME CASES.

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[With Plates VIII.—IX.]

CARCINOMA of the stomach may be present in two histological forms, the spheroidal-celled and the cylindrical-celled carcinoma, the former variety being much the commoner. Further, either variety may produce a definitely circumscribed tumour, or a more general infiltration of the organ with malignant disease. It is about this infiltrating diffuse form of carcinoma that the present communication is concerned.

Diffuse carcinoma of the stomach is a comparatively rare disease, and one which, in its symptoms and course, differs very markedly from the common type of gastric cancer. I propose to relate the history, and describe the appearances, of two cases of this disease, which I have called extreme cases, because they represent the very earliest and the very latest phase of the same condition. I will begin then with the advanced case, because it represents the ordinary type of "general carcinoma" of the stomach.

W. H., a collier, aged 51, had been ailing for about twelve months. His symptoms began very insidiously with loss of appetite, loss of flesh, and enlargement of the abdomen. He had had pain and slight vomiting occasionally, but had never brought up any blood. When I saw him first, on September 18, 1901, he presented the most extreme degree of emaciation of the face, limbs, and chest, whilst the abdomen was enormously distended, forming a protuberant globular swelling. In fact, he bore a startling resemblance to a child with advanced tubercular peritonitis. The pulse was 88, small volume, but regular. Temperature was normal. Tongue red, glazed, and dry. The skin was of a bronzed colour, and was stretched tightly over the bony prominences. He had not much severe pain, but the abdominal enlargement caused him great discomfort and breathlessness. For nearly six months, the swelling had been noticed, and he had been losing flesh,

and during this time he was only able to take small quantities of fluid nourishment. The abdomen was tapped by a Southey's tube, and six quarts of straw-coloured fluid (sp. gr. 1018, solid on boiling) drawn off. It was a little blood-stained at the end. After this had been done, a hard, irregular mass about the size of a fist could be felt in the epigastrium. On September 24, 1901, the abdomen was opened, and as the stomach was involved in a dense mass of malignant disease, nothing could be attempted. He died on October 14, at which time there had been considerable re-accumulation of ascitic fluid. At a partial post-mortem examination the whole peritoneum was found to be much thickened; but, except in the region of the stomach, there was no new growth. The great omentum was drawn up as a thick, indurated cord against the lower border of the stomach, and the latter was firmly fixed under the left lobe of the liver in a hard mass, which had quite lost any resemblance in shape, size, or texture, to the normal viscus. Its position in the abdomen was nearly vertical, its long axis lying almost in the mid-line. A considerable mass of new growth occupied the lesser curvature, and invaded the region of the portal fissure. But there was no new growth in the liver itself, and it was the pressure on the portal vein which caused the ascites. When isolated from the surrounding viscera, the stomach was an irregular pyriform mass, measuring $4\frac{1}{2}$ inches long, $2\frac{1}{2}$ inches broad, and $1\frac{3}{4}$ inches thick. On cutting it open by a median longitudinal section, its cavity is seen (Fig. 1) to be reduced to a mere chink or slit between the thickened and indurated walls. The œsophagus and duodenum are practically normal, but every part of the stomach-wall is infiltrated with new growth. The infiltration has produced the thickest mass around the distal half of the gastric canal, and, at the lesser and greater curvature, has extended beyond the stomach-walls to invade the portal fissure of the liver and the great omentum respectively. It is only at the fundus of the cardiac extremity that any real cavity exists in the stomach, and at that point the invasion by new growth is not so massive as elsewhere. As regards the actual coats of the stomach, the mucous membrane has an unbroken surface, with neither fungating outgrowth nor eroding ulcer, the muscular wall, which is distinctly seen in the surface of the

section, is very much hypertrophied, being in parts $\frac{1}{2}$ inch thick. Its continuity seems to be nowhere destroyed throughout the organ. This growth and hypertrophy of the muscular coat, in the neighbourhood of malignant disease, is seen in all other parts of the alimentary canal, when these are affected by cancer, and although it may sometimes be due to functional hypertrophy of muscle above a stricture, it is certainly not always so, because it is seen often (as in the present case) to be best marked in the very midst of the new growth itself.

Histologically the stomach-wall is everywhere invaded by narrow columns of spheroidal cells with large nuclei and well-marked cell bodies. In the micro-photograph (Fig. 3) the cancer cells are seen embedded between layers of muscle cells. The spaces between the round cells are probably only due to shrinkage caused by the reagents.

The specimen forms a striking example of what used to be called the india-rubber-bottle stomach. It is evident that, for several months at least, such an organ can have performed no digestive functions whatever, and only served as a narrow channel to convey nourishment from the gullet to the intestine.

The second case, in almost every respect, presents a marked contrast to the first, and it is only, when the microscopical character of the disease is examined, that its identity in the two instances becomes evident.

E. C., married woman, aged 27, no family. For four months she had had frequent attacks of vomiting and abdominal pain, at the end of which time Dr. Fairbanks noticed a small lump in the epigastrium, and sent her to the General Hospital on July 28, 1903. She was a thin woman with a high colour, and of a very neurotic temperament. When she was first seen in the out-patient room there was distinctly felt a small area of resistance under the upper part of the right rectus. It was difficult to define this as a definite mass. The history she gave of her vomiting was very indefinite, the sickness bearing no special relationship to food, and no blood being brought up. She thought she had lost flesh, and was certain she had lately been very constipated. After admission, she was kept in bed, and during this time exhibited practically no symptoms of illness at all. The induration or lump in the epigastrium, after being definitely noted by Mr. Lewellyn, the Assistant House Surgeon, on the first day, was not to be felt again at all. No

PLATE VIII.

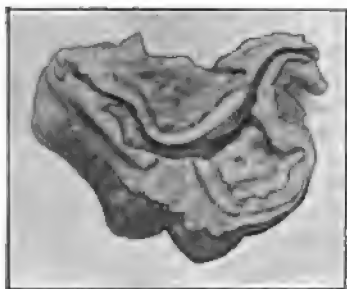


Fig. 1.

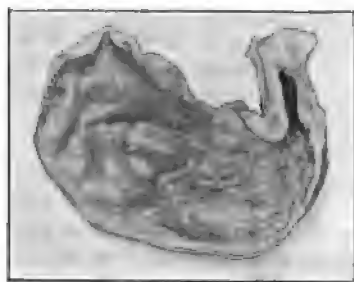


Fig. 2.

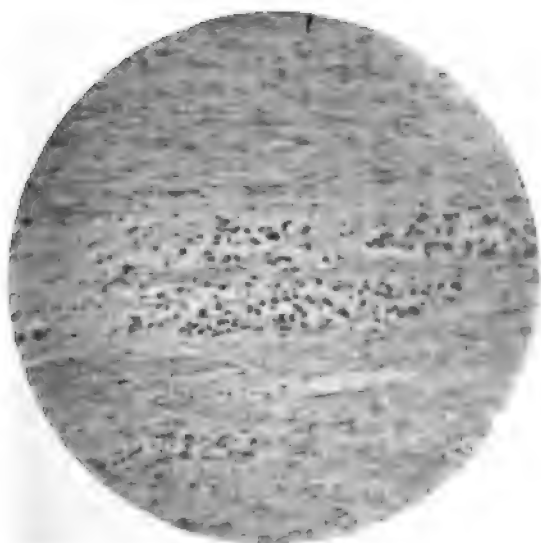


Fig. 3.

PLATE IX.

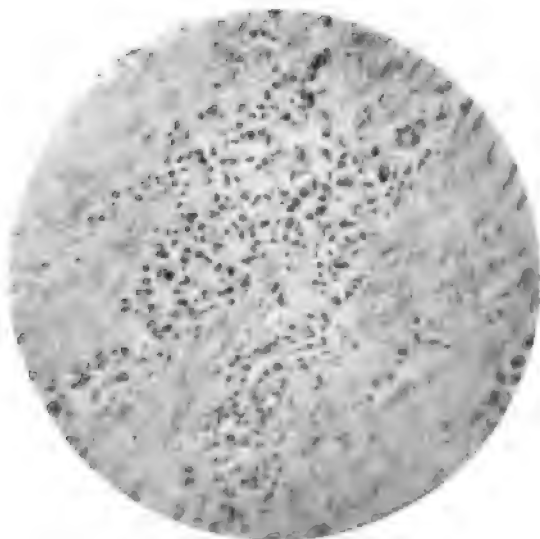


Fig. 5.

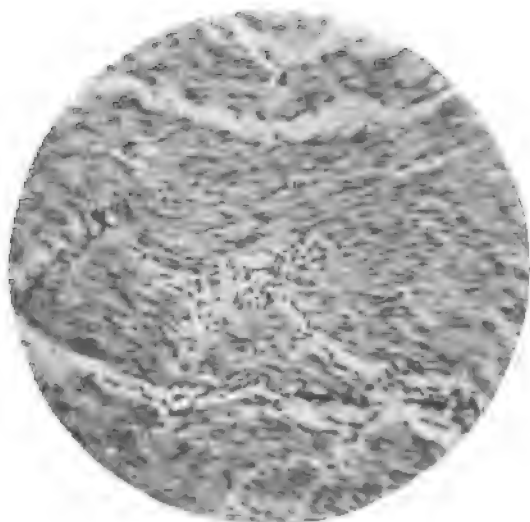


Fig. 6.

vomiting occurred, the bowels were opened regularly when she took small doses of cascara sagrada, and her food was increased until she took the full diet, including meat and vegetables, with good appetite and without pain. The question then arose as to diagnosis and treatment. The epigastric swelling was the only physical sign we had to go upon. As Dr. Fairbanks, Mr. Lewellyn and myself had all independently observed it on different occasions, I felt sure that it was not an error of observation. Her age, and the way she could take large meals without discomfort, seemed to put a pyloric growth out of the question, and we thought that, at most, it was due to a contraction of the rectus over some tender adhesions, *e.g.*, the gall-bladder. The diagnosis of adhesions would also have explained the constipation and the subsidence of the symptoms during rest in bed. I proposed to open the abdomen, at which suggestion the patient promptly returned to her home in Wells. I heard nothing more of her until three weeks afterwards, August 12, 1903, when one of the residents at the Hospital, who had not seen her before, informed me that a woman, who had been under my care a short while ago, had that day been admitted suffering apparently from a large ovarian cyst. He added that she was very ill, and it looked as if the cyst had a twisted pedicle. And I am bound to say that, having regard only to the condition in which she then was, that this diagnosis was the obvious one. She was extremely ill, with sunken eyes and flushed face; the pulse

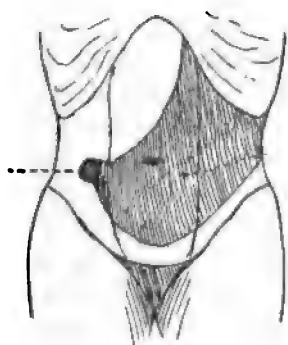


Fig. 4.

was 120, and the temperature 99° F. She constantly vomited about an ounce at a time of black shreddy fluid, which gave the guaiacum reaction for blood. The abdomen was much

distended, chiefly to the left of and below the umbilicus by a smooth elastic swelling, which felt like a cyst, and was, moreover, absolutely dull to percussion. Continuous with this and lying over the right semi-lunar line, on a level with the navel, was a small hard solid lump, which was slightly movable (*see* Fig. 4). A large stomach tube was passed, and 52 ounces of black fluid gushed out, as if under great pressure, and a considerable quantity which escaped at the side of the tube was lost, so that there had been probably two quarts of fluid in the stomach. The abdominal swelling had now disappeared—the solid lump had shifted its position higher up and nearer the mid-line, and was freely movable. The pain and distress were relieved, but her general condition was still very bad. The next day I had a consultation with my colleagues, and, in view of her very weak condition and a quick pulse (varying between 110 and 130), it was unanimously agreed that it would be wiser to wait and feed her by the rectum, until the general condition improved. However, the improvement never came. She gradually became unconscious, her face presented a dusky cyanosis, and respiration took the form of deep irregular sighing. This state continued, until death occurred on the fourth day after admission. The only other point of clinical interest noted was the fact that the hard mass, which seemed evidently at the pylorus, became less and less definite until at the time of her death it was quite impalpable.

Post-mortem Examination.—The stomach was greatly distended, measuring 40 cm. in length. The greater curvature descended nearly to the pubes. The pylorus presented no abnormality from the outside and was quite flaccid. On opening the stomach, the mucous membrane was seen in many parts to be marked by small erosions, the size of a pin's head, but there was no ulcer or growth affecting it. Two fingers could easily be inserted from the stomach through the pyloric opening. This was packed with tow, and the stomach hardened and preserved by Kaiserling's method. It was cut in two by a longitudinal section and the anterior half is shown in Fig. 2. The walls of the pylorus are much thickened, measuring 1.5 cm. at the thickest part. The lumen of the outlet of the stomach is not encroached upon, and is 2 cm. in diameter. The thickening of the pyloric wall begins abruptly at the duodenal junction, remains for about the same degree for 8 cm., and then

gradually tapers off into the normal thickness of the gastric wall on the lesser and greater curvature.

From the facts above narrated this case appears to be one of "acute dilatation of the stomach" such as Fagge described, and having regard to the patient's age and to the appearance of a thickening of the walls of the pylorus which gradually shades off into the adjacent gastric walls, it exactly resembles a case of hypertrophic stenosis of the pylorus in the adult, such as Mr. Maylard¹ described in the *Lancet*, and a reference to the figure, which illustrates his article, will show how nearly the condition resembles that just described. But a microscopical examination throws quite a different light on the subject, and clearly shows this case to be one of malignant disease. Fig. 5 is a photograph of the section, and except that the cells, both the spheroidal cells and the muscle cells, are larger than those in Fig. 3, the two specimens might have been taken from the same case. Fig. 6 is a photograph of a section which Mr. Maylard very kindly lent me from his case of hypertrophic stenosis, and I have reproduced it here for the sake of comparison. The absence of the columns of large nucleated sphenoidal cells at once distinguishes it from the section of carcinoma.

I have described this second case, too, as one of diffuse carcinoma, because the limits of the growth are so very indefinite, extending as it does along both curvatures of the stomach, and not affecting the mucous membrane at all, but merely insinuating narrow bands of cancer cells between the muscle fibres, which show a degree of hypertrophy corresponding to the amount of malignant growth in their neighbourhood. If it had not been for what may be termed the accident of death, from acute dilatation of the stomach, the whole organ would probably have soon been invaded, and a condition of "india-rubber-bottle stomach" similar to the first case would have been produced. And it is a matter of some interest to note that death was brought about by the active contraction of that hypertrophied muscle, the growth of which is only secondary to malignant infiltration. Almost every specimen of cancer of the intestine, from the stomach to the rectum, shows this muscular hypertrophy, and it is often stated, or assumed, that this hypertrophy is of a compensatory nature, to enable the viscus to overcome the resistance caused by

the obstruction of a growth. But that it is the direct result of the irritation of the cancer cells, and not to provide for mechanical compensation, is clearly shown in Case 2 ; because here, if the mechanical theory was correct, the muscle would be hypertrophied on the proximal side of the growth, and not just at the pylorus, where its contraction actually brought about occlusion of the gastric outlet.

The variety of carcinoma of the stomach, at so early an age as 27, would make such a diagnosis very unlikely in the absence of histological evidence. Perry and Shaw,² in a series of 50 cases examined microscopically, found no case of cancer in patients younger than 32. Hale White³ quotes Norman Moore as having described an undoubted case of carcinoma in a girl of 13. Mayo Robson⁴ operated by a gastro-enterostomy for a pyloric cancer in a girl of 21.

A point of great practical importance in this connection is the fact that, if the patient in Case 2 had so far rallied from her acute condition as to permit of an operation, I am quite sure that if (as would most probably have been the case) the pylorus had presented the same flaccid condition under anæsthesia, as it did after death, no tumour would have been suspected, and at the most a gastro-enterostomy would have been done. And it would certainly be unjustifiable to excise every pylorus which is thickened on the suspicion of possible malignancy. Therefore, the only alternative would be to remove a piece of the pylorus at the same time as the gastro-enterostomy is performed in every doubtful case, and then excise the growth at a subsequent operation, if the microscope proves it to be malignant.

In conclusion, I have to express my sincere thanks to Mr. Maylard for allowing me to use the illustration taken from his case, and to Mr. James Taylor, who very kindly took the micro-photographs which illustrate this article.

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 - ² Perry and Shaw : "Malignant Disease of the Stomach," *Guy's Hospital Reports*, Vol. XLVIII.
 - ³ Hale and White : "Tumours of the Stomach," Allbutt's *System of Medicine*, Vol. III., p. 555.
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HYDROCEPHALUS AND POSTERIOR BASIC
MENINGITIS.(PART OF A DISSERTATION FOR THE DEGREE OF M.D.
IN THE UNIVERSITY OF OXFORD.)

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AN investigation, recently undertaken into the sequelæ of non-fatal meningitis in children, has produced some material which, it is hoped, will elucidate certain obscure points in the ætiology of hydrocephalus. This investigation included 128 cases, and particulars of these were, with few exceptions, derived from the records of the Hospital for Sick Children, Great Ormond Street. My thanks are due to the staff of that hospital, to Dr. Hawkins, who has allowed me to include a case under his care at St. Thomas's Hospital, and to Dr. Lees, who has kindly furnished me with records from his private notes. Letters of enquiry were addressed to the parents of 80 children, and exactly 40 answers were received. Most of these answers are much more valuable than I had anticipated. In some cases, were brought to me for inspection, children several of whom had been patients more than seven years before. In others, doctors kindly provided me with information concerning the state of the patients preceding, or subsequent to, their stay in hospital.

The close connection which exists between hydrocephalus and posterior basic meningitis is significant, not only for the light it throws upon the ætiology of the former condition, but also because it demonstrates the fact that many cases of posterior basic meningitis show very few signs or symptoms, and that a very mild form of the disease is by no means rare.

Carr, who was impressed by the virulence of the disease from the study of his 11 cases, came to the opposite conclusion. "Non-congenital hydrocephalus," he wrote, "begins as a rule with a gradual enlargement of the head without any very marked disturbance of the general health—very different from the severe symptoms which accompany basic meningitis."

But so long ago as 1827 it was known that non-congenital hydrocephalus is often preceded by a severe illness (which had not at that early date received a distinctive name), as may be seen in an account by Alexander Monro, which I have recently quoted elsewhere. Again, some 30 years later, Trousseau ended his lecture on cerebral fever by a discussion of chronic hydrocephalus, in the course of which he said : " The frequent recurrence of convulsions, for some length of time, should even cause a medical man to suspect the possible supervention of hydrocephalus. In the case of a child, at present in the ward, the convulsive seizures recurred for two months and a half before the head began to enlarge. These convulsions usually increase in violence by degrees, and it very frequently happens that, when they have lasted for a certain time, the patient is carried off by an attack of cerebral fever, and the lesions of cerebro-meningitis are then found on dissection."

At present it will be my endeavour to show :—

1.—That current views on the ætiology of hydrocephalus rest on insufficient authority, and that, hitherto, cases, beginning in the first months of life, have been grouped with those present at birth.

2.—That some of the undoubted cases of congenital hydrocephalus are due to meningitis.

3.—That, as Still says, "hydrocephalus is so frequent a result (of posterior basic meningitis) that it might almost be considered a symptom." He adds, "in almost all cases which last longer than three or four weeks, this complication is present in sufficient degree to be noticeable clinically," an assertion which, to judge from my results, rather overstates the case.

4.—That in older children, posterior basic meningitis sometimes leaves sequelæ, which are probably the signs of what may be called concealed hydrocephalus, that is to say, hydrocephalus without any appreciable enlargement of the head.

5.—That in the majority of cases of hydrocephalus, enlargement of the head begins at the age when posterior basic meningitis is most common ; that, at the onset, the presence of posterior basic meningitis can be recognised, in every grade of severity, in those cases in which all the classical features of the malady are present, as in those in which only

one symptom is present ; and that beyond these latter are certain cases which begin at the same period of life, in which no symptoms are recorded at the time of onset.

I.—THE INADEQUACY OF CURRENT VIEWS OF HYDROCEPHALUS.

In the first place, although this condition is seen commonly enough in hospitals, the patients are usually removed to their homes before death, and often they die quite suddenly of some mild intercurrent affection. Secondly, the history of the onset is usually very imperfect ; the picture of the transitory disease has been obliterated by the more obtrusive chronic condition which has resulted therefrom. Thirdly, the necropsy presents peculiar difficulties which call for special methods of examination. One author froze the infants, and cut sections of the head, but by far the most satisfactory method is that recommended by Lees and Barlow. Carr says, "In advanced cases of hydrocephalus a satisfactory examination of the membranes at the base of the brain is almost impossible." And, writing of posterior basic meningitis, Lees and Barlow point out that "if the brain be removed in the ordinary way, it may be impossible to decide accurately whether the cerebro-spinal foramen be opened or closed ; and if the spinal cord be neglected, an adhesion of the spinal membranes may be overlooked, which may account for hydrocephalus with no apparent obstruction within the brain."

Chronic hydrocephalus was the subject of a dissertation, written for the degree of Doctor of Medicine of Oxford, by Ruffer in 1888. In discussing the ætiology of acquired cases, he confirms the general belief in the influence of syphilis, tubercle, and violence. He does not mention meningitis as a causative factor ; although in his description of the onset he asserts "that sometimes a fit is the first symptom, or else the child shows all the signs of meningitis." He found that 9 out of 103 cases of hydrocephalus were congenital, and that 93 began in the first 6 months, from which he concluded that "the vast majority of cases of hydrocephalus therefore are congenital, and, if not actually present at birth, the disease generally makes its appearance within the first month of life." The indiscriminate association of truly

congenital cases with those beginning in infancy has been accepted by most authors, and accounts for much of the obscurity in the literature. Henoch, however, distinguishes between these two cases clearly enough. "It is certain that in a number of cases the disease is congenital . . . Much more frequently, however, the children come into the world apparently healthy, and it is some months after birth before the relations are struck by the unusual growth of the cranium." He does not pronounce very definitely on the ætiology: "I cannot find any connection with congenital syphilis such as is occasionally assumed."

It is curious that Henoch appears to believe that, in a large proportion of all cases of hydrocephalus, the excess of fluid is outside the brain. (*Hydrocephalus Externus*.) Although a review of the morbid anatomy of these diseases is not within the province of this paper, I mention this in order to refute the two chief reasons for this supposition, both of which are clinical.

First, "I think that the absence, or at least slight development, of the cerebral symptoms—especially a satisfactory state of the mental powers—are points in favour of a diagnosis of *Hydrocephalus Externus*." But numbers of cases—Hilton's and Taylor's are quoted here and several of my own—have been published in which with a marked degree of internal hydrocephalus, the mental powers have been quite satisfactory. As Monro says, "It is almost incredible how little the powers of the mind are impaired by this disorder."

Secondly, he quotes a typical case of posterior basic meningitis (headache, head-retraction, pyrexia, vomiting &c.), in a boy of 3, in whom hydrocephalus developed, and whom he kept under observation for $2\frac{1}{2}$ years. After 4 months the head ceased to enlarge, the boy became quite healthy, and the skull-bones reunited. He supposes that the excess of fluid was re-absorbed (though no diminution in the size of the head is recorded), and that therefore it was probably not inside the brain, for "it is very hard to conceive in what manner the empty space can be filled up." Whereas if the fluid were outside the brain, the latter could readily re-expand. In point of fact, in such cases the ventricles remain dilated throughout life.

Of recent years, Quincke has added some valuable contributions to our knowledge of hydrocephalus ; but his experience has been chiefly among adults. In this connection another difficulty presents itself, for, "as Weber points out, many of the cases of apparently acute hydrocephalus in adults and older children are really exacerbations of a chronic condition."

This aspect of the subject will be referred to again below.

2.—SOME UNDOUBTED CASES OF CONGENITAL HYDROCEPHALUS ARE DUE TO MENINGITIS.

Lees and Barlow quote two cases to this effect, one of which is fairly conclusive.

I have one case to add, and though it dates back as far as 1869, I think it is trustworthy, for the child during his illness, and the subsequent necropsy, was under the charge of Dr. Dickinson.

Case 105.

Age $\frac{10}{12}$. Circumference of head, 26 in. Enlargement of the head was first noticed at 6 weeks. It is described as a congenital case because there was very clear evidence that the mother suffered from hydramnios during her pregnancy.

"On removing the tentorium cerebelli, there was seen a stratum of pus, like a diffused abscess ; this was situated on the right side, and had evidently originated in a meningitis."

The ætiology of hydramnios, is obscure, but "in general the fault is on the foetal side." (Galabin.)

3.—THE FREQUENCY WITH WHICH POSTERIOR BASIC MENINGITIS LEADS TO HYDROCEPHALUS.

In 38 out of the 50 necropsies, published by Lees and Barlow, there was excess of fluid in the cerebral ventricles ; and in most of these the excess was very marked.

In other words, in 3 out of every 4 fatal cases of posterior basic meningitis some degree of internal hydrocephalus may be expected. And this series of cases also shows that the longer the child lives, the more advanced is the hydrocephalus likely to prove, provided the case is going to end fatally.

In cases of recovery, hydrocephalus is not nearly so common a sequel. This is partly because in many of these the inflammation is of so mild a nature that probably there is very little deposit of lymph about the base of the brain, and, partly, because, in a large proportion of the fatal cases, it is the hydrocephalus rather than the meningitis which proves fatal. Often, however, the two conditions are co-existent, and it is impossible to allot to each its proper effects.

The following considerations, nevertheless, make it probable that hydrocephalus after a posterior basic meningitis, which is not fatal, is a more common sequel than would at first appear.

- (1) The very mild cases are commonly treated at home, and the child is only sent to hospital when it is noticed that the head is enlarging. Then only a very incomplete history of the original disease is to be obtained.
- (2) The average age amongst non-fatal cases is higher than the average of all cases; hence, what is generally recognised as clinical evidence of hydrocephalus is often wanting. But in some of these cases symptoms have remained, which are similar to those shown by older children or adults, in whom hydrocephalus has been found after death. These cases will be described under the name of concealed hydrocephalus.

The results in my own cases may be grouped as follows :—

A.—I was able to trace 17 cases of posterior basic meningitis which had been sent home as “recovered.” Of these, 7 will be dealt with when concealed hydrocephalus is considered; 2 developed hydrocephalus with enlargement of the head.

Case 54.

Age $\frac{6}{11}$. A boy who had had 10 fits before admission, and was in the hospital 8 weeks with mild pyrexia, frequent vomiting, slight head retraction, and temporary amaurosis.

Age $2\frac{5}{12}$. I saw him. Fontanelle widely open. Circumference of head, $21\frac{1}{2}$ in. His mother wrote: “He has not

been off his bed ; his head is much larger. He has no use of his limbs, and has to be fed. Quite helpless."

The history in the other case is worthy of special attention, because it illustrates a very important fact, viz., that in this disease complications are very common, and are often held responsible for the symptoms, so that the possibility of meningitis is overlooked. In the first place, the patients are usually teething. Secondly, a considerable number of them suffer from otorrhœa (at least 9 of my series). Others have rhinorrhœa, and not a few develop some capillary bronchitis. In fact, almost all who require prolonged nasal feeding do. Lastly, these patients are very liable to intercurrent infection, and several of mine were transferred to fever hospitals before they had recovered from the meningitis.

Case 90.

Age 2. This child had a mild attack with no very pronounced symptoms. Head-retraction was scarcely present, although there was definite rigidity of the neck and spasticity of the trunk and limbs. It happened that the time, for a second physician to take over the charge of this patient, coincided with the appearance of acute mastoid disease on the right side. This was pronounced to be the source of the child's symptoms, and after the necessary operation, the child was sent out "recovered." Even on its departure, however, the child still showed some spasticity, and with others who had had the advantage of seeing the child since its admission to hospital, I thought that the mastoid mischief was a complication in the course of posterior basic meningitis. Five months later this child came back to hospital with unmistakable hydrocephalus.

B.—My list contains 14 cases, who were sent out with the description *in statu quo*, which is intended to convey that no change, either for better or worse, is apparent in the child's condition at the time of its departure. Three of these cases developed hydrocephalus whilst still in the hospital, and it is noted of a fourth, 7 months after the onset, that "the eyes

are distinctly a little depressed, and co-ordination disturbed." Two others died of "water on the brain"; one 2 months and the other 6 months after leaving hospital.

Another, who is now, 10 years after the attack, a paralytic imbecile (Case 10 referred to below) probably suffered from arrested hydrocephalus. It was noted that the head appeared to be getting larger; also that Mr. Ballance "saw the child and said that tapping the ventricles might improve the child."

Four months after the onset the circumference of the head was 19 inches. The child was then 8 months old, at which age, in the normal instance adduced by Lees and Barlow, the circumference was $17\frac{7}{8}$ inches. When I recently saw the boy, the head circumference was 23 inches and the anterior fontanelle was closed.

Lastly of this group, two belong to the category of "possibly concealed hydrocephalus."

C.—To that category also belong 4 out of 7 cases which were sent out "improved," and which I have been able to trace. Another developed hydrocephalus whilst in hospital. This is a very important and almost unique case, as he is an instance of survival after the operation of sub-dural drainage. The operation was performed by Mr. Ballance.

Case 29.

Age $3\frac{8}{11}$. *March 25.* Fell from a chair.

March 26. Illness began. He developed pyrexia, head-retraction, which lasted a fortnight. and right-otorrhœa which endured for several weeks.

April 27. On admission.—Looked very ill. Lay quiet, very irritable if disturbed. No optic neuritis. Fontanelle closed. No paresis or rigidity. Tremor of hands.

May 3. Sits up sometimes and feeds himself. Very tremulous. Screamed for 3 hours last night.

May 16. Frequently sick. Has nasal feeding.

May 30. Head-retraction very marked. Child rigid.

June 1. Quite comatose. Face grey. Hands cold.

June 6. Evidently sees and hears.

June 14. Progressive emaciation. Probably hears. Is nasally fed. *Operation.*—Skull trephined.

Dura mater incised. Silk thread passed into lateral ventricle.

June 15-23. Several general convulsions.

June 23. Operation.—Silk thread replaced by india-rubber tube.

June 28. Certainly more conscious.

July 6. Knows his mother and speaks to her.

August 9. Seems less intelligent. Tries to eat his toys, and has not spoken for some weeks.

September 13. Operation.—Tube removed.

October 2. Screams all day as much as ever.

November 2. Makes efforts to talk. Can walk with help.

March 28. Plate introduced over hernia cerebri.

April 3. Bright and playful. Absolutely deaf. Makes a little grunting noise.

Age 10. (6½ years after the original illness) I saw him at a "Deaf and Dumb School," which he had attended for 3 years. A healthy, happy boy, making steady though slow progress at the lip-language. Head dolicho-cephalic; not obviously enlarged. The mistress reported nothing abnormal beyond perhaps a slight tendency to fall when running about.

Out of these 38 cases, therefore, 10 developed demonstrable hydrocephalus, and 12 showed some, possibly equivocal, symptoms of that condition.

4.—IN OLDER CHILDREN, POSTERIOR BASIC MENINGITIS SOMETIMES LEAVES SEQUELÆ, WHICH ARE THE SYMPTOMS OF CONCEALED HYDROCEPHALUS.

Concealed hydrocephalus is a condition well known to neurologists. It may be the result of (i.) an intracranial inflammation which has occurred after the skull has become sufficiently firmly ossified to prevent separation of the bones, or (ii.) a hydrocephalus of infancy with enlargement of the head which ceased to advance after a few months. Of this latter condition I have some 5 examples, and in some of them, a few years later, it would be impossible, without a knowledge of the history, to say that the size of the head exceeded

the natural limits. In one the size of the head distinctly diminished (Case 19, described below). The factors, which determine the accumulation of cerebro-spinal fluid, are only very partially known, and we know nothing of the agency by which such an accumulation is interrupted.

With the most advanced hydrocephalus, it is well known that the individual may suffer very little. To the many instances in literature, Rüffer adds the record of "a remarkably clever medical man, 30 years old." On the other hand, it is equally established that the individual may be a paralytic idiot. This same great diversity of effect exists amongst the cases now under consideration, and adds very greatly to the difficulty of the subject.

I have divided my cases of concealed hydrocephalus (about 30 in number) into four groups.

A.—Sudden Death: Relapse: Sudden Attacks of Vomiting, Headache and Pyrexia.

Sudden Death.—First, there is the phenomenon of almost sudden death.

Lees and Barlow relate how a child who, except for occasional vomiting, seemed quite well, and gained flesh during three months after an attack of posterior basic meningitis, but who "was carried off in 24 hours by an attack of vomiting." The cerebro-spinal foramen was quite closed, and the ventricles were much distended. Another child of theirs, in whom the brain was in a similar condition, remained well for seven months after her recovery, and then died, "after 2 days of slight catarrh."

Hilton's case, a man of 34, had visited the Crystal Palace on the day of his death. "He had had some vomiting in the morning, and again about two hours before he reached home. He walked from the Crystal Palace, and when he entered the house he staggered and said he felt giddy and oppressed. . . . He died in a short time . . . but was sensible almost to the last moment."

Case 56.

Age $4\frac{9}{12}$. Posterior basic meningitis in hospital. Sent out "much improved."

„ $24\frac{1}{2}$. The mother wrote "you will hardly know her, she is so fat." I saw her and noted a bright intelligent

child. Talks fairly clearly. Knee-jerks normal.

Can nearly walk, but not without hands being held.

Age $3\frac{1}{2}$. "She was taken in convulsions one day, remained unconscious, and died the next."

This was the only fit or illness she had had in the last $2\frac{1}{2}$ years.

Relapse.—Secondly, the clinical picture sometimes seems to point definitely to a relapse of a meningitis. In such cases, the necropsy reveals chronic internal hydrocephalus, though what part this has played in the story I cannot say. Taylor quotes the case of a boy, who had an illness, which was probably posterior basic meningitis, at the age of eight months; although he showed signs of retarded development, and later suffered from nocturnal enuresis, yet he grew up to be strong and intelligent—he played the violin and sang well. When 16 years old, he had a series of headaches; a month later, his gait became unsteady, vomiting began, and he rapidly succumbed. Four days before death, head-retraction was marked. At the necropsy, the skull bones were found to be remarkably thinned, which pointed to the long duration of the hydrocephalus.

Case 44.

Age $1\frac{1}{2}$. Fits, vomiting, head-retraction, and squint. Very ill for six weeks, when improvement began. At the end of two months she had a second attack of fits and became worse again.

- „ 2. *Admitted.*—Head-retraction, amaurosis, rigidity of legs, mental deficiency. Sent out "*in statu quo.*"
- „ 5. "My child has quite recovered, both in eyesight and also the use of her limbs."

Case 53.

Age $\frac{5}{12}$. Head-retraction, amaurosis, convulsions, squint, so-called "*influenza.*"

- „ $\frac{7}{12}$. Beginning to improve. Some sight returned.
- „ $\frac{11}{12}$. Measles.
- „ $\frac{11}{12}$. In hospital. Head-retraction and a temperature which never fell below 100° .

Description on leaving, "Posterior basic meningitis *in statu quo.*"

- „ $\frac{13}{12}$. Death, certified as due to "consumption."

Influenza and consumption are the names given to many cases of posterior basic meningitis.

Case 7.

Age 9 $\frac{8}{13}$. Head-retraction, vomiting, headache, otorrhœa, tremors for 6 weeks.

The symptoms gradually subsided, but never quite stopped.

„ 9 $\frac{8}{13}$. Admitted to hospital, complaining of “distension of the stomach!”

April 14. Tall girl. Emaciated. Nothing else abnormal.

April 18. Feeds fairly well. No vomiting. No pyrexia.

April 20. Vomited yesterday and headaches.

May 10. Screaming attacks at night. Constant vomiting.

May 21. Temperature 104·2°. Head - retraction marked. Unconscious.

A month later, she died. Marked internal hydrocephalus was found.

Sudden attacks of Vomiting, Headache, and Pyrexia.—

Thirdly, there are those cases in which the patient alternates between a state of comparative comfort, and one in which he appears to be extremely ill. It is to these cases that Box has referred in his recent paper on “The Crises of Posterior Basic Meningitis.” I think this is a misnomer, because I do not think the so-called crises are ever seen during the initial attack of meningitis, but are always associated with, and are characteristic of, chronic hydrocephalus.

Case 29.

Who exhibited such alternations, has already been described. (Page 186.)

Case 102.

Age 10. A boy, who was ill for over 7 months, and who was under my observation (when I was house physician at St. Thomas's Hospital) during the later period of his illness.

It is noteworthy that he was said to have had

incontinence of urine during the first 9 years of his life.

When convalescent from chicken-pox, he fell down-stairs. The same evening he was sick, and was admitted into a local hospital with headache, vomiting, and irregular pyrexia, head-retraction, and Koenig's sign. Later he was sent to St. Thomas's Hospital. During the last 4 months of his illness, and up to within a few weeks of his death, he showed the most remarkably sudden alternations. In the morning he would be sitting up, cheerful and chatting, with a normal temperature, and a good appetite. The evening of the same day might find him screaming with headache, vomiting up bile continuously, and very feverish. The clinical aspect was thus in marked contrast to the mental attitude characteristic of posterior basic meningitis.

But although the physician, who made the necropsy, wrote that "there were obvious signs of a posterior basic meningitis," those signs, I recollect very well, showed no evidence of recent activity. They consisted in a thickening and opacity of the membranes, but there was no recent lymph or pus. The cerebral ventricles were enormously distended with clear fluid.

The clinical picture of the exacerbations with which one meets in hydrocephalus, rather than of the phenomena apparent in an uncomplicated posterior basic meningitis, was confirmed by the post-mortem findings.

This lad had been ill for six months, and was losing 2-3 lbs. a week, without any intermission. On the suspicion that the disease was a neurosis, a nasal feed was administered on June 1st. On June 2nd his weight was 2 st. 9 lbs. During the next week, he did not vomit once, and on June 8th his weight was 2 st. 13½ lbs.—a gain of 4½ lbs. in six days.

The next day vomiting began again. A second nasal feed gave no result, and ten days later his weight was 2 st. 9 lbs. again. Two weeks later he died.

Case 95.

Age 3. A boy who showed similar but less sudden alternations. He died four months after the onset of posterior basic meningitis. The necropsy revealed excess of fluid outside as well as inside the brain, and this although the cerebellum was completely bound down to the medulla.

April 4. (Ill 6 weeks.) Fairly well and lively. Eats well.

April 14. Very drowsy. Screams with occipital pain.

June 14. Much better. Much more intelligent. Feeds well. No vomiting.

June 15. Has had another fit.

June 22. Semi-comatose.

Case 45.

Age 5. An attack of headaches, vomiting and giddiness.

„ 9. An in-patient and subsequently an out-patient. Frontal headaches. Vomiting, which occurs in attacks. No optic neuritis.

January 28. Two bad attacks of headache—wets his bed at night.

March 5. One bad attack of headache and vomiting.

July 8. Wets his bed nearly every night.

September 8. Vomited twice.

„ 10. *April 21.* Headache.

„ 11. *January 5, 1903.* Vomits again.

This boy is still an out-patient at the National Hospital. The diagnosis is “? Hydrocephalus.”

(To be continued.)



A REVIEW OF SOME RECENT WORK ON SYPHILIS.

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THE TREATMENT OF VENEREAL DISEASE IN THE ARMY.

Two reports on this subject have recently been issued by the Advisory Board for Army Medical Services. The first volume deals mainly with the recent literature on the subject of venereal diseases, and commences with a brief account of the various prophylactic measures, which have been adopted in this, and in other countries. It then proceeds to describe the different methods of treatment of syphilis, and to compare and contrast their relative efficacy. The administration of mercury by the mouth is first briefly described, and its advantages and disadvantages are pointed out, more prominence being given to the latter. Inunction is next mentioned, and the routine of Aix-la-Chapelle and Wiesbaden is specially alluded to. The most important feature of this volume is, however, a description of the various methods of intra-muscular injection practised at home and abroad, a description so complete and comprehensive as to justify us in saying that it is a most valuable addition to the literature of the subject. No work in the English language treats of intra-muscular injections at any length and with any detail, and the practitioner, who desires to make trial of this method, cannot do better than perfect himself in the subject by a perusal of this section. The treatment of chancroids and of gonorrhœa is also fully discussed, but in these subjects references to foreign literature are not so freely made use of, and some of the recommendations are open to criticism. Though it is recognised that the various modifications of nitrate of silver are the only reliable gonococcicides, yet hardly sufficient stress is laid upon the importance of using these applications at the earliest available opportunity. The volume closes with reports on the prevalence of the disease in the various military stations, and gives statistics and charts which will be found useful for purposes of reference. The second

volume is a report of the evidence given before the Advisory Board by members of the profession, both military and civilian, who had special knowledge and experience of the subject. Information was sought for as to the most efficient methods of treatment of syphilis, as to when, how, and for how long mercury should be administered, as to the value of the iodides in syphilis, and as to the best means of treating gonorrhœa. An analysis of the evidence would not be of great value, seeing that on many debateable points there was a great divergence of opinion, in some degree due to the widely different conditions and surroundings of civilian and military patients. Treatment by intra-muscular injections appears to be almost universal throughout the service, and to yield far better results than those obtained by other methods, and it is obvious that where the individual is under constant supervision and discipline, this plan will meet with better results than others; but, in the ordinary cases of syphilis, very few private or hospital patients will submit to it, and it is only in severe and malignant syphilis that it can be adopted. One cannot fail to be struck by the very excellent recommendations, laid down for the treatment of syphilis in the army, by Col. W. J. Fawcett, R.A.M.C.

EXPERIMENTAL RESEARCHES ON SYPHILIS.

Metchnikoff and Roux (*Annales de l'Institut Pasteur*, Nov. 1904) publish the results of their researches on syphilis, so far as they have at present advanced. They dwell upon the necessity of the most rigorous scientific conditions in carrying on experiments with the view of determining the nature of the syphilitic virus. As, until recently, syphilis had not with any certainty been inoculated into animals, the field of investigation had been reduced to inoculations of men, but these had been so few, and had been carried out in such a manner, as to render them of very little scientific value.

But the discovery of the susceptibility of anthropoid apes to the syphilitic poison has caused a considerable advance in our knowledge of the nature of the syphilitic virus. In two previous communications, it had been shown that the syphilis of man could with certainty be inoculated into the chimpanzee,

and could thence be transmitted to others of the same species. At present no information had been obtained as to the nature of the virus, in spite of the most minute examinations, nor had any microbe been discovered. It had, however, been ascertained that it did not belong to the group of so-called invisible microbes, for the active principle of syphilis would not pass through the Berkfeldt filter in the same way as the invisible microbes of aphthous fever, of yellow fever, of foot-rot, or of bovine peripneumonia. An hour's heating at a temperature of 124° F. renders it innocuous to the chimpanzee, but the mixture of secretion from a chancre with glycerine does not affect its inoculability if used immediately after the glycerine is added.

In short, filtration, or heat up to 124° F. for an hour, deprives the syphilitic secretions of their virulence, a fact of significance, since we know that certain microbic diseases, deprived of their virulence by similar means, are of service as vaccines.

Experiments made on chimpanzees with the virus filtered or heated to 124° F. failed completely, but on subsequently inoculating the same animals with active virus from a syphilitic subject, the inoculations were perfectly successful.

In the same way, if an animal was inoculated with the syphilitic virus in so minute a dose as not to produce any local lesion, no symptoms supervened, from which it may be concluded that the virus, so attenuated as to cause no local lesion, is useless as a vaccine, and that, to obtain immunisation, it is necessary to utilise a virus capable of causing some local manifestations, even though they may be of the most trifling nature. This was proved by inoculating a chimpanzee with virus taken from a lesion in a *Macacus simius*, in which animal the poison was greatly attenuated. This chimpanzee showed after this first inoculation a chancriform cutaneous lesion, very insignificant, and not followed by any secondary symptoms; this animal had since proved to be refractory to inoculations with active human virus.

Thus, Metchnikoff and Roux have been led to study the action of the syphilitic virus on certain of the inferior apes, in which they could attain the necessary degree of attenuation. Some of these apes were altogether refractory to the poison, but others showed a slight susceptibility, for instance, the

Macacus rhesus, in which one out of three inoculated presented a chancre not followed by any secondary symptoms. The long-tailed *Macacus* was more amenable, for, in ten cases out of twenty, the inoculations were followed by chancrous lesions with slight glandular enlargement, but no secondary eruption. As for the *Macacus* of Buffon, it seemed still more receptive, for it gave ten successful inoculations out of fifteen, with similar symptoms to the varieties above mentioned. These researches show a considerable advance, for, in addition to clearly establishing the possibility of experimenting on animals, they show the methods by which the virus may be attenuated with the view of obtaining a vaccine.

At a more recent meeting of the Académie de Médecine, Metchnikoff and Roux announced the result of their investigations on the "spirochæte paluda" discovered by Schaudinn, of Berlin, and stated by him to be invariably present in primary syphilitic lesions, in secondary papules, and in the inguinal glands. Of the inoculated apes at the Pasteur Institute, six were examined to ascertain the presence of this spirillum, and in four it was discovered; it was also found in the papular syphilide of man in four cases out of six, and in one case of congenital syphilis. The organism is a very minute protozoon, almost transparent, of a corkscrew form, highly mobile, and very difficult to stain, and requiring special staining agents.

McWeeney (*B. M. J.*, June 10, 1905) confirms the presence of these organisms in syphilitic lesions, and illustrates their form and appearance. He concludes that the spirochæte may be etiologically connected with syphilis, and emphasises the importance of making careful search for it in deeply situated lesions beyond the reach of surface contamination, and of establishing its absence in non-syphilitic ulcers of the genital tract. He thinks that possibly the tertiary and congenital forms of the disease may prove to be chronic intoxications, due to the metabolic products of the spirochæte.

GENERAL PARALYSIS OF SYPHILIS.

A. Fournier (*Arch. de Méd. et Chirurg. Spéc.*, April, 1905) proves by statistics that general paralysis is unknown during the first two years of syphilitic infection; it is very seldom met with

after the twentieth year, and never after the twenty-third year. In the majority of cases it manifests itself in the mid-tertiary stage, from the sixth to the eleventh year after infection. Cerebral syphilis, on the other hand, may appear after the first year, increasing progressively until it reaches its maximum at the third year ; after that time, it is rarely met with. The principal etiological factors of general paralysis are nerve strain, alcoholism, and venereal excess ; but the two real causes are a mild form of syphilis in the early stages, and inadequate treatment. Four-fifths of the cases of general paralysis are met with in subjects, who have been insufficiently treated, and it would appear that severe tertiary syphilis is always the result of defective treatment. When general paralysis is present, mercury, even in strong dosage, is powerless to effect any good, and is even harmful. Accordingly, the treatment of syphilis recommended is a series of energetic courses of treatment during the first two years of the disease, a rest of three years, a year of treatment in the fifth year, a rest of two years, and another course about the tenth year. Since statistics showed that general paralysis usually manifested itself about the sixth year after infection, and that it attained its maximum of frequency about the tenth year, it might be logically deduced that efficient courses of mercury administered about the fifth year, and again at about the seventh or eighth year, would prevent the occurrence of general paralysis. This method has the advantages over the usual plans of treatment, in which most of our therapeutic efforts are expended in the early stages of the disease. It is also most important to make a general study of the patient, to take into consideration his general health, his habits, his régime, his hygienic surroundings, his previous illnesses, and his constitutional shortcomings, whether hereditary or acquired. But the most important point is to study the condition of the patient's nervous system, for if this is overtaxed or damaged by hard work, or other causes, it is almost certain that the syphilis will attack this weakened point. It is, therefore, necessary to treat those who, by their methods of living, are predisposed to syphilis of the nervous system, by preventive hygienic measures ; by removing all causes of mental excitement ; by the avoidance of all sorts of excess, especially venereal, and by the prohibition

of overwork, fatigue, excitement, and alcoholic excess. They should be recommended to lead a quiet, regular, and peaceful life, preferably in the country, and intermingled with occasional courses of "rest cure." Courses of hydrotherapy, from their tonic action on the nervous system, are of the utmost value as a preventive measure, and should always be recommended to those whose hereditary tendencies, or whose nervous condition, would seem to predispose to syphilis of the nervous system. It is well to bear in mind that, of all the dangers which can emanate from syphilis, the most serious and the most numerous are associated with the nervous system, which is the habitual and the preferred victim of the disease. After the skin, the brain is the organ most frequently attacked by syphilis, and syphilitic affections of the nervous system are greatly in excess of all the other tertiary manifestations of the disease.

THE ABORTIVE TREATMENT OF SYPHILIS.

Duhot (*Annales de la Polyclinique centrale de Bruxelles*) recommends the early, vigorous, and abortive treatment of syphilis, which consists in giving the patient the maximum of mercury that his system can tolerate, continuing the treatment for as long as possible, and diminishing the intervals between each mercurial course. Administration of mercury by the mouth is absolutely of no avail for this purpose; the inunction treatment is blind and uncertain, and the only method, which can successfully cope with the disease, is that of intra-muscular injections. The treatment should be commenced, as early as possible, before any manifestation of secondary syphilis has made its appearance, and should be sufficiently energetic to destroy in its infancy the syphilitic virus, so that no manifestation of the disease presents itself either during or after the treatment. The conditions requisite for the success of the treatment are that it should be commenced immediately the induration of the chancre has established the diagnosis; that the maximum dose of mercury compatible with the resistance of the individual should be employed, and that the courses of treatment, especially the initial one, should be prolonged. The reason for the failure of the early treatment to abort the subsequent symptoms of the disease has hitherto been due to

the insufficiency and inefficiency of the measures employed. The dose of mercury, which Duhot considers efficient, is 1 centigramme of metallic mercury daily, the salts recommended being calomel, grey oil, and salicylate of mercury. Calomel is undoubtedly the most powerful antidote to syphilis; no other salt possesses the same certainty and rapidity of action. It should be injected in doses of 10 to 12 centigrammes every eighth day; 10 to 12 injections constituting a course. Calomel rapidly breaks up on its introduction into the system, and the metallic mercury given off has superior therapeutic powers to those of any other mercurial salts, even though they contain larger doses of mercury. If the calomel is not tolerated, grey oil is recommended in doses of 15 centigrammes every four or five days, for so long as the patient can tolerate it; 15 being the minimum and 25 the maximum number. Salicylate of mercury is also efficient, being less painful than the other two preparations, and less liable to cause gastrointestinal irritation; it should be given every two or three days in 10 centigramme doses; 15 to 25 injections constituting a course. The first course should last for three months, during which time the patient should be kept under close observation, and, if he shows no susceptibility to the treatment, it should be prolonged to four or five months. Periods of intermission from treatment are absolutely necessary to enable the patient to recover from the depressing effects of mercury, and the following is given as an average plan of the treatment:—

First Year.

1st course.—3 months.	1st rest.—1½ months.
2nd course.—2½ months.	2nd rest.—1½ months.
3rd course.—2 months.	3rd rest.—1½ months.

Second Year.

1st course.—2 months.	1st rest.—2 months.
2nd course.—1½ months.	2nd rest.—1½ months.
3rd course.—1½ months.	3rd rest.—2 months.
4th course.—1½ months.	

Third Year.

1st rest.—2½ months.	1st course.—1½ months.
2nd rest.—2½ months.	2nd course.—1½ months.
3rd rest.—2½ months.	3rd course.—1½ months.

Fourth Year.

1st rest.—2½ months.

2nd rest.—2½ months.

3rd rest.—2½ months.

1st course.—1½ months.

2nd course.—1½ months.

3rd course.—1½ months.

The majority of patients will tolerate perfectly such a course of treatment, which will render them free from any symptom of the disease during their treatment, and will ensure their definite cure. It may be objected that such a treatment would be superfluous in cases of benign syphilis, to which the reply may be made that there is no such a disease as benign syphilis; there is only one syphilis, and it is a grave disease. The mildness of the early symptoms gives no guarantee as to the future, and this is instanced by the case of a patient, who, forty-five years after a very mild attack of the disease, consisting only of a faint roseola and a few mucous patches, developed locomotor ataxy.

This abortive treatment is not only beneficial to the syphilitic subject himself, but to society at large. As regards the patient, the disease is limited, in 95 per cent. of cases, to the initial lesion; no roseola is seen, or any of the other familiar manifestations; and since by this treatment every sign of the constitutional manifestations of the disease is averted, it must be admitted that the virus, whatever it may consist of, is not only attenuated, but is rendered harmless. Most surgeons attach but little importance to the roseola, which is, however, the criterion of a general systemic infection by the syphilitic virus, indeed many wait for its appearance before commencing treatment. As a cutaneous manifestation it is of no serious import, but, coincidently with its appearance, there is produced in the whole system a series of vascular changes and degenerations, which, though invisible, are productive of those later lesions and scleroses, with which we are impotent to deal. And this early invasion of the vascular system is probably the initial cause of the endarteritis, which later will involve the nervous system, and will give rise to tabes and general paralysis, and other serious manifestations. As regards society at large, this abortive treatment constitutes the ideal, which Professor Fournier has named "the prophylaxis of syphilis by treatment," since, by rendering the patient harmless to his fellow creatures

through the absence of syphilitic manifestations, society will by this means be protected against him.

INTRA-MUSCULAR INJECTIONS OF CALOMEL IN SYPHILIS.

Ernest Lane (*The Polyclinic*, November, 1904) eulogises the treatment of syphilis by intra-muscular injections, and recommends calomel as being the most powerful antidote to the syphilitic virus; the dose recommended was $\frac{1}{4}$ of a grain of calomel, or 5 centigrammes, suspended in m xvii. of sterilised olive oil, eight injections at a week's interval, or longer, constituting a course. (Since writing this paper, its author has considerably increased the number of injections he considers requisite for the initial course, and now recommends 15 or 20 prolonged over four to six months.) The intensity of the disease should be a guide to the energy of the treatment, and, since the insoluble preparations are far more powerful than the soluble ones, they are specially indicated in the severe and malignant phases of the disease, and where it is desirable to get the patient under the influence of the drug with the least possible delay. The general course of the disease and the constitution of the patient should be taken into account, and the more energetic the treatment, the greater should be the precautions taken to ensure the patient against ginjuritis, gastro-enteritis, and other signs of intolerance of the drug. A rapid saturation with mercury was the best preventive of the tertiary stage of the disease, and to ward off this stage was the main object of treatment; the patient should be got under the influence of the drug as rapidly as possible, and should be kept under its influence for as long as possible; thus he should have treatment for eight or nine months in the first year, for six months in the second year, and for four months in the third year.

INTRA-MUSCULAR INJECTIONS OF IODIPIN IN TERTIARY SYPHILIS.

Duhot (*Revue pratique des Mal. Cutan. Syphil. et Vénér.*, December 1, 1904) recommends the use of iodipin in the general and local treatment of tertiary syphilis. Discovered in 1897 by Winternitz, iodipin is a chemical combination of

iodine and oil of sesame, prepared in two strengths of 10 and 25 per cent. It is destined to replace iodide of potassium, which possesses the many disadvantages of iodism. It may be administered by the mouth, hypodermically, and intramuscularly; hypodermically it may be given in doses of 10 grammes daily for 30 or 40 consecutive days, or intramuscularly it may be given in the same dosage, but a special syringe and needle must be utilised, as the flow of this viscid fluid through the ordinary syringe was necessarily slow and painful. The cases treated by this remedy comprised aortic lesions of syphilitic origin, pains, and perforating ulcers in tabetic patients, and gummata, which had resisted other forms of treatment. A case instanced was that of a woman of 45, the subject of congenital syphilis, who for thirty-three years had suffered with syphilitic ulceration and fistulæ. Without any general treatment, the patient was cured by bi-weekly injections of iodipin at the base of the ulcers. The action of iodipin on the general system was exemplified by the disappearance of a gumma of the sternum at the end of five weeks.



THE CURRENT THEORIES REGARDING THE
CAUSATION OF ARTERIO-SCLEROSIS.

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THE discussions on arterio-sclerosis which took place recently at the Pathological Society of London, the annual meeting of the American Medical Association and the German Congress of Internal Medicine, have attracted general attention, both from its intrinsic importance, and from the controversies which have so often arisen concerning its etiology. Within the last few years a considerable amount of work on this subject has been published, and a review of the facts and theories with regard to its causation seems appropriate at the present time.

The term arterio-sclerosis is unfortunately vague and indefinite. By some writers it is applied to diffuse arterial alterations alone, while others include as well the localised lesion, endarteritis deformans. Some observers consider that it is essentially a disease of the smaller vessels; and some, that the lesions may be confined to the aorta alone. In this review, I shall employ the term in its widest and most literal sense, "a hardening of the arteries," and shall include within my scope all those lesions which interfere with the contractility or the elasticity of the arteries, whether these lesions are local or diffuse, and whether they affect the larger or the smaller vessels exclusively, or both at the same time.

Arterio-sclerosis is very often present in *chronic renal disease*. Bright himself was cognisant of the frequent association, and pointed out that in some cases the radial and renal arteries were diseased, and that the left ventricle might be hypertrophied. Sir George Johnson¹ showed that the vascular lesions were widespread, that the increase in bulk of the vessel wall was mainly due to increase of the muscular tissue, the result, he considered, of its continued over-action or spasm, and

¹ *Med. Chir. Trans.*, 1850, Vol. XXXIII., p. 107; *ibid.*, 1868, Vol. LI., p. 57; *ibid.*, 1873, Vol. LVI., p. 139.

from these observations elaborated his famous "stop-cock" theory.

In 1872 Sir William Gull and Dr. Sutton read a paper¹ before the Royal Medico-Chirurgical Society, in which they again insisted upon the frequent co-existence of renal and arterial disease. They maintained, however, that the thickening of the arterial walls was mainly fibrous, that the overgrowth affected the adventitia in particular, the muscular layers being virtually degenerate, and that the lesions in the kidney were simply a part of the general fibrous overgrowth. But, in addition, they maintained that these arterial changes might occur without any renal lesion at all, and they came to the conclusion that "this morbid condition in the arterioles and capillaries is the primary and essential condition of the morbid state called chronic Bright's disease with contracted kidney."

The controversy between Sir G. Johnson and Sir W. Gull and Dr. Sutton was carried on for some years, but it has eventually been decided, as Dr. Dickinson says in his Baillie Lecture,² that there was much truth and some error on both sides. In renal cirrhosis the muscular walls of the small arteries are indeed hypertrophied, but the fibrous tissue of their adventitia is also increased; and degenerative changes occur comparatively early in the hypertrophied media. Renal cirrhosis may be secondary to arterial disease, but it is far more often the primary lesion.

Sir George Johnson urged that the muscular hypertrophy of the smaller vessels was the result of an attempt on the part of the arterioles to prevent impure blood from reaching the tissues, and that, from the increase in the peripheral resistance which the arterial spasm caused, the general blood pressure was raised, and the left heart in consequence hypertrophied. Dr. Dickinson's evidence, however, showed that Sir G. Johnson's theory was untenable. *A priori* it seemed improbable that the cardiac and arterial actions were antagonistic; and if the "stop-cock" theory was true, the small vessels and the small vessels alone, should be involved. Examination of the larger arteries revealed the fact that they

¹ *Med. Chir. Trans.*, 1872, Vol. LV., p. 273.

² *Lancet*, 1895, Vol. II., pp. 137, 280.

also were thickened, so that the whole systemic circulation was involved, and some general cause must be invoked. The fact that all forms of renal disease are not necessarily associated with arterial degeneration is important. It is only in those cases where the arterial tension is high that the association obtains, and this high tension, however produced, is in all probability the primary cause of the arterial change.

Dr. Dickinson was of the opinion that Sir William Gull and Dr. Sutton's theory of arterio-capillary fibrosis as the initial cause was untenable. In a few instances, the sequence might be such, but in the vast majority of cases the renal lesion was primary. He considered that the rare coincidence of hepatic fibrosis, which he only noticed in 37 out of 250 cases of granular kidney, was a fact which tended to show their etiological independence, though this is probably of little importance, as the vascular supply is derived, in one case wholly, and in the other only to a slight extent, from the systemic arteries.

The idea of a widespread affection of the smaller arteries, as a *primary* lesion, dates from Gull and Sutton's paper. The gross changes of atheroma had of course been long recognised, but "arterio-capillary fibrosis" had never been demonstrated before. These authors, however, acknowledged that its causation was obscure. "The changes, though allied with senile alterations, are probably due to distinct causes not yet ascertained."

The *influence of age*, as a causal factor in arterial disease, has for long been considered proven. The great incidence of the change in persons over middle life, as contrasted with those under 30 years of age, has struck all observers, and even now many, if not most, writers describe a senile involutionary form. Old age, however, is not an entity of disease, but rather a symptom-complex, and it seems to me that to describe it otherwise, is simply to hide our ignorance beneath our verbiage. Arterial disease is not a necessary complement of antiquity, Thomas Parr, for example, having vessels which showed nothing abnormal¹; and its presence simply indicates that at some period or other, perhaps long antecedent, influences, detrimental to arterial integrity, have been at work.

¹ Gibbon: *Diseases of the Heart*, 1898, p. 815.

Sometimes these may have been acute, and recovered from though the scars are left ; more often, perhaps, they have been chronic and slight, but have continued active over a long period of time.

Excessive muscular exertion is another factor, which many have taken into account. The especial frequency with which atheroma is met with in men as compared with women, and in men of laborious occupations as contrasted with those whose work is sedentary, its marked incidence in the first portions of the aorta where presumably vascular strain is greatest, and its infrequency in the pulmonary artery, unless evidence of high pulmonary pressure is also present, all seem to point in this direction. But the mechanical theory can scarcely be applied to every instance of the disease ; it is difficult to understand, for instance, how it can cause lesions in the cerebral vessels, and evidence of a kind which compels attention has been forthcoming against it. McCrorie¹ examined the post-mortem records of the Royal Infirmary in Glasgow, and found, in a series of 210 post-mortems, that 20·34 per cent. of the female and 17·22 per cent. of the male subjects had degenerate arteries ; and, in another series of 209 post-mortems, that 22·91 per cent. of the female and 19·87 per cent. of the male subjects were affected. The incidence of laborious occupations in the affected cases was not striking, although precise figures were wanting, and he was dissatisfied with the theory as accounting for the special distribution of the lesions.

The possibility of excessive muscular exertion producing trauma of the arterial walls must also be considered. Sir William Gairdner² refers to the case of a young man, who, leaping down from a wall, ruptured his aorta and died very rapidly, but slighter lesions might conceivably arise from less extreme efforts. The higher incidence of arterial lesions in the vessels of the extremities, as compared with those of the viscera, has often been remarked and suggests such a cause, and this point might, I think, be investigated further with advantage.

The theory of overstrain has been applied to a different class of cases, in all probability with more success. The

¹ *Glasgow Med. Jour.*, 1892, Vol. XXXVIII., p. 94.

² *Trans. Assoc. Amer. Phys.*, 1891, Vol. VI., p. 196.

association of arterial disease, and increased blood pressure in later life, has long been noticed, and the latter was generally considered to be the result of the former. Professor Clifford Allbutt,¹ however, has for some time maintained the opposite, considering the increase of blood pressure the causal factor of the arterial disease. He believes that from several causes, the most important of which is "repletion, relative or positive, *i.e.*, tempered or untempered by air and exercise," an "increased viscosity" of the blood is produced, and that from the increased difficulty in the capillary circulation, the blood pressure is augmented, and degenerative processes are, in consequence, initiated in the overstrained arterial system. His evidence of such a mechanism is wholly from the clinical point of view, though none the less telling, but he has accepted Dr. Savill's pathological observations² as the complement to his clinical experience. This author has examined the vascular apparatus in a large number of elderly individuals, and has come to the conclusion that in many cases an arterial hypermyotrophy exists. The condition is always generalised, though predominant here and there as local conditions come into play, (for example, in the legs where gravity aids,) and is "the first step to all medial degenerations." It may be secondary to chronic renal disease, but it is mainly associated with continued high blood pressure. Alcoholism, he believes, is one of its most potent causes.

Dr. Russell,³ too, has taken up the same standpoint, and has brought forward evidence from both the clinical and the pathological sides in support of his contention. He differs in detail from Professor Allbutt, considering that the initial abnormality—increase of the peripheral resistance—is the result of arteriolar rather than capillary difficulty, but his general conclusions are similar. Professor Allbutt considers that the initial wrongdoing, in such cases, is the excessive ingestion of food beyond what the work done requires, or the elimination is sufficient for; and alcoholism may lend help,

¹ *Lancet*, 1903, Vol. I., pp. 170, 330, 472, 645. *Trans. Path. Soc.*, 1904, Vol. LV., p. 438.

² *Trans. Path. Soc.*, 1904, Vol. LV., p. 375. Cf. Gibson, *Lancet*, 1903, Vol. II, p. 1564.

³ *Lancet*, 1901, Vol. I., 1519; *ibid.*, 1903, Vol. I., pp. 394, 550. *B.M.J.*, 1904, Vol. I., p. 1297.

though not perhaps of itself causal. Dr. Russell thinks that toxic conditions, often the result of gastro-intestinal disturbance, are the chief cause of the increase in arterial pressure, and recommends reduction of the proteid intake and increase of the carbohydrates in such cases.

The investigations of Hasenfeld¹ and Hirsch² may be noticed here. These observers state that, in cases of renal cirrhosis, both ventricles of the heart are hypertrophied and not the left alone; and that the hypertrophy is always considerable. Arterio-sclerosis, without renal disease, is not necessarily associated with cardiac hypertrophy; and this, when it does occur, is moderate in degree and affects the left ventricle alone. Arterial changes are often confined to special parts of the vascular tree, and cardiac changes only follow when the splanchnic vessels or the thoracic aorta are effected; even well-marked affection of the peripheral vessels may be present without any ventricular hypertrophy. v. Basch's "latent arterio-sclerosis" is, in Hasenfeld's opinion, the result of splanchnic sclerosis.

Croftan³ has performed a series of experiments upon rabbits which throw some light upon this subject. The hypodermic injection of uric acid, over long periods of time, produced no alteration in the blood pressure, in the arteries, or in the heart. Injections of solutions of xanthin or hypoxanthin, however, invariably caused definite lesions. The epithelium of the tubuli contorti of the kidney was found to be granular and fatty, and the intertubular capillaries and arterioles showed proliferating endarteritis. The blood pressure was distinctly elevated, and the left heart was always hypertrophied and sometimes dilated. In two animals, where the injections were repeated daily for about six months, the arteries showed small cell infiltrations of the intima and adventitia, and necrotic patches were visible in different parts of the vessel walls. The media was thicker than normal.

He states that various observers have experimented with urea, and that a rise of blood pressure and cardiac hypertrophy resulted. The lesions, which he noticed in the renal epithelium

¹ *D. A. f. klin. Med.*, 1897, B. 59, S. 193.

² *D. A. f. klin. Med.*, 1900, B. 68, S. 55.

³ *Amer. Jour. Med. Sci.*, 1900, Vol. CXX., p. 592.

and arterioles, have also been described by other observers (Walker Hall,¹ Gaucher,² Kolisch and Tandler³) using similar methods.

Croftan considers that the association of renal and arterial lesions may result in different ways. Renal cirrhosis may be the result or the cause of arterio-sclerosis; and in another class (gout, lead-poisoning), the two changes are the concomitant effects of the same poison.

The association of *gout*⁴ and arterial disease has for long been observed, and the insidious effect of *lead-poisoning*⁵ is also well recognised. But the process, by which the vascular changes occur, whether they are the direct effect of the intoxication, or only a result of a secondary and general disturbance of metabolism, is still undetermined. Renal disease, too, though commonly present, may be absent while the arterial lesions are well marked.

Josué's experiments⁶ with adrenalin are also of interest. He has produced typical calcareous atheroma in the aorta of animals, into whose veins small doses of this substance had been repeatedly injected, and Erb⁷ and v. Rzentkowski⁸ have recently corroborated his results. The mechanism of the association is, however, not very apparent. Adrenalin produces only a temporary hypertension of the vessels, and Josué's injections were too few in number to have produced any continuous effects in this direction.

The effects of *alcohol* on the arteries are difficult to estimate. Many observers consider its influence important, Dr. Savill, indeed, saying that it is the main cause of medial changes; but a paper by Dr. Cabot⁹ shows that the subject requires further investigation. He examined 283 cases of chronic alcoholism in patients under 50 years of age, and found evidence of arterial damage in but 6 per cent. In 45 cases of arterio-sclerosis, a history of alcoholism was only antecedent

¹ *The Purin Bodies*, 1903, p. 70.

² *Revue de Méd.*, 1888, t. VIII., p. 885.

³ Stuttgart, 1895.

⁴ Fitcher: *Jour. Amer. Med. Assoc.*, 1904, Vol. XLIII., pp. 1600, 1680.

⁵ Billings: *Jour. Amer. Med. Assoc.*, 1904, Vol. XLIII., p. 772.

⁶ *La Presse Méd.*, 1903, p. 798; 1904, p. 281.

⁷ *Wiener med. Presse*, 1904, No. 18, s. 885.

⁸ *Berlin. klin. Wochenschr.*, 1904, No. 31, s. 830.

⁹ *Jour. Amer. Med. Assoc.*, 1904, Vol. XLIII., p. 774.

in 13 per cent., and of 95 post-mortems, under 50 years of age, in which the arteries were degenerate, only 21 per cent., or, excluding renal cases, 17 per cent. gave an alcoholic history.

If high-blood pressure is the most important cause of arterio-sclerosis, Dr. Cabot's statistics are not improbably correct, for Dr. Crile,¹ as a result of his experiments, came to the conclusion that the administration of alcohol produced no elevation of the blood pressure, either in normal animals, or in those in a state of shock.

This apparent contradiction is not unexpected when comparable intoxications are considered. Tobacco amblyopia, for example, does not seem to be the direct result of tobacco intoxication, but only ensues when symptoms of general metabolic disturbance make their appearance (Dr. Maitland Ramsay); and the disturbing influence of alcoholism on the general functions of the organism may quite well produce changes of a kind, which disturb the general dynamic relations of the arterial system. The strong consensus of opinion as to its evil effects cannot be disregarded without much fuller investigation.

Thoma's ideas² upon arterio-sclerosis are so well known that a very brief *résumé* will suffice. "Compensatory end-arteritis" is the keynote of his thesis. He asserts as a general law that, whenever from any cause slowing of the blood current takes place, the lumen of the vessel becomes narrowed by intimal hypertrophy to such an extent as to ensure the normal rate of flow being maintained. In diffuse arterio-sclerosis, the ultimate cause may be either a primary weakening of the media and consequent dilatation of the vessels, or a slowing of the blood current from increased resistance in the peripheral tissues. In the patchy cases, local damage to the media causes a local dilatation of the lumen of the vessel, and consequently a compensatory local intimal hyperplasia. The main facts, upon which he bases his theory, are the character of the alterations which normally take place in the vascular system of the infant after birth, and those which ensue in, for example, the vessels of an amputated limb. But there seems

¹ *Blood Pressure in Surgery*, 1903.

² *Text-book of General Pathology*, 1896.

to be little doubt that his theory is inapplicable to all cases of arterial disease. In obliterative endarteritis of a coronary artery, following obstruction of the orifice, the intimal change is, very possibly, produced in the way which he describes, but the medial changes in these cases are of quite different character from those of general arterio-sclerosis; and, in the latter disease, even extreme medial changes may be accompanied by little or even no intimal abnormality. As Dr. Russell pointed out, his paraffin-wax casts of atheromatous aortas are just as good evidence of primary intimal, as of primary medial, change; and patchy endarteritis, though, when advanced, always associated with changes in the other coats, is at an early stage often, though not invariably, the sole lesion.

Dr. Gibson,¹ too, has adversely criticised Thoma's theories from the mathematical point of view, while Dr. Councilman² considers that some of his explanations are extremely hypothetical and have no analogy in pathology. Huchard,³ in the latest edition of his *Maladies du Cœur*, declines even to consider the question. The discussion is perhaps of little moment, as it only bears on the mechanism by which arterial disease is produced, and leaves out of account the ultimate causes which it is so important to recognise.

*Syphilis*⁴ has without doubt a special predilection for the arterial system. The smaller arteries are generally affected, and the results are usually local, though many vessels may be damaged. The cerebral vessels and the aorta are probably those which are most frequently involved, the latter suffering secondarily to affection of its vasa. But it seems to be generally accepted that the histological appearances are somewhat indefinite, even in the early stages, and that evidence of syphilis in other ways is required to complete the diagnosis in each case. The scars of ancient attacks can never be accurately related, and the frequency of the association is in consequence in doubt. Its importance is, however, great, as the intima, as well as the media and the adventitia, is affected, and

¹ *Lancet*, 1896, Vol. II., p. 804.

² *Trans. Assoc. Amer. Phys.*, 1891, Vol. VI., p. 179.

³ *Traité clinique des maladies du cœur*, 1899-1905.

⁴ Bibliography; *A System of Medicine*, 1899, Vol. VI., p. 319. Huchard: *loc. cit.*

often causes narrowing of the lumen of the vessel and not infrequently thrombosis, with the result, when the cerebral vessels are affected, of grave and often fatal symptoms.

Dr. Drennen¹ made some remarks at the American Congress which are worthy of further consideration. Is *mercury*, he asked, a wholly innocuous substance? Has it no influence upon the blood vessels? And in how many instances is post-syphilitic arterio-sclerosis the result of long-continued mercuric poisoning? An answer cannot be given, but the hint should be accepted, and the administration of such drugs kept under proper medical supervision.

Evidence has gradually been accumulating that the *infections as a whole* are not infrequently a cause of arterial damage, the French school being the particular advocates of this mode of causation; Simnitzky² has recently emphasised the connexion.

It has for long been recognised that in cases of pyæmia, patches, similar in their nature to those met with on the valves of the heart, may be found on the arterial walls, and that an infective arteritis may occur by extension from a neighbouring septic focus. In the usual course, such lesions are discovered at an early period of their existence, but some writers (Huchard and others) maintain that acute aortitis, for example, may be a primary lesion, and, moreover, may be recovered from.

Tubercle bacilli,³ pneumococci,⁴ anthrax bacilli,⁵ streptococci, staphylococci, have all been found in aortic lesions, though, as a rule, micro-organisms are absent.

Gilbert and Lion,⁶ in 1889, produced atheroma of the aorta in rabbits, by the intravascular injection of the micro-organisms found in a case of infective endocarditis, and they found a similar condition after the injection of typhoid bacilli, in a rabbit whose aorta had been previously damaged by the introduction of an aseptic probe.

¹ *Jour. Amer. Med. Assoc.*, 1904, Vol. XLIII., p. 729.

² *Zeit. f. Heilk.*, B. XXIV.

³ Blumer: *Amer. Jour. Med. Sci.*, 1899, Vol. CXVII., p. 19.

⁴ Cuzzaniti: *Gaz. del Osped.*, Naples, 1891.

Oliver: *Lancet*, 1891, Vol. II., p. 1033.

C. R., *Soc. de Biol.*, 1889, Oct. 12; *Arch. de Méd. expér.*, 1904, t. XVI., p. 73.

Boinet and Romary¹ obtained similar results after the injection of typhoid bacilli, without any previous traumatism, and with tubercle bacilli, bacilli coli, and streptococci in cases where the aorta had been damaged previously.

Thérèse² was unable to discover any atheromatous patches in animals which had been injected with micro-organisms, but he found leucocytic collections around the minute vessels of the kidneys, heart, and aorta after the injection of streptococci and diphtheria bacilli.

Dr. Mott³ has produced arteritis by damaging the outer tunics of an artery with nitrate of silver, and Sumikawa⁴ has corroborated his results; the latter states that the intimal lesion alone may persist, those in the outer and middle layers disappearing, more or less, in course of time.

Placques of recent atheroma are often present in the aortas of individuals who have died from acute disease. They have been observed in cases of small-pox (Brouardel,⁵ Huchard), enteric fever (Thayer,⁶ Landouzy and Siredey⁷), diphtheria (Martin,⁸ Boinet⁹), erysipelas (Boinet, Thoinot and Griffin,¹⁰ Huchard), pneumonia (Fiessinger¹¹), acute rheumatism (Legroux¹²) scarlatina (Landouzy and Siredey), and measles (Huchard).

The mechanism by which such lesions are produced is probably varied. Flexner,¹³ for example, reports a case of tuberculosis of the aorta in which the lesion seemed to be due to infection of the intima from the blood stream; while Martin records the microscopic appearances in a case of diphtheria in a child 9 years old, where the local patches on the aorta seemed to be related to arteritis of the vasa in the outer coat.

¹ *Arch. de Méd. expér.*, 1897, t. IX., p. 902.

² *Thèse de Paris*, 1893. Cf. Crocq, *Arch. de Méd. expér.*, 1894, t. VI., p. 583; and Pernice, *Arch. per la Sc. med.*, Torino, 1887, Vol. XI., p. 1.

³ *A System of Medicine*, 1899, Vol. VI., p. 298.

⁴ *Zeigler's Beitr.*, 1903, B. xxxiv., s. 243.

⁵ *Arch. Gén. de Méd.*, 1874 t. II., p. 641.

⁶ *Jour. Amer. Med. Assoc.*, 1904, Vol. XLIII., p. 726.

⁷ *Revue de Méd.*, 1887, t. VII., pp. 804, 919.

⁸ *Revue de Méd.*, 1881, t. I., p. 32.

⁹ Huchard: *loc. cit.*

¹⁰ Huchard: *loc. cit.*

¹¹ *La pneumonie à Oyonnax*, 1891.

¹² *Bull. d. l. Soc. méd. des Hôp. de Paris*, 1884, Nov. 5.

¹³ *J.H.H. Bull.*, 1891, Vol. II., p. 120.

Syphilitic lesions of the aorta are always associated with similar vasal lesions.

The small arteries are not infrequently affected in acute disease, but the observations recorded upon this point are, as a rule, only side issues of the investigation, and the importance of the point has thus escaped due recognition. Investigations on the cardiac muscle, for instance, record the occurrence in many instances of periarterial hyperplasia, the adventitia of the vessels being, as a rule, involved in the process. I¹ have recorded its presence in cases of pneumonia, pleurisy, small-pox, enteric fever, blackwater fever, and sepsis, and it has been described as present after death in cases of diphtheria (Huguenin,² Rabot and Philippe³), rheumatism (Poynton,⁴ v. Leyden⁵), chorea (Poynton), and scarlatina (Romberg⁶); and similar conditions are often found in the liver and kidneys in cases of general blood poisoning. Endarteritis and general arteritis of the minute arterioles have been found in enteric fever (Hobbs,⁷ Huchard), diphtheria (Huguenin, Martin,⁸ Mollard and Regaut⁹), scarlatina and small-pox (Landouzy and Siredey, Huchard); and may be met with locally in any organ the site of an inflammatory process.

Clinically, blocking of the veins and arteries during or after an attack of enteric fever is not at all uncommon, and arterial thrombosis has been attributed, in certain cases, to an arteritis, though of course it is in many instances the result of embolism.¹⁰

Thayer¹¹ has recently investigated the cardio-vascular system of 183 patients who had been at an antecedent period in the wards of the Johns Hopkins Hospital suffering

¹ *Jour. Path. and Bact.*, 1903, Vol. IX., p. 88.

² *Thèse de Paris*, 1890.

³ *Arch. de Méd. expér.*, 1891, t. III., p. 646.

⁴ *Encyclopædia Med.*, 1902, Vol. X., p. 385.

⁵ *Internat. Clinics*, 1898-99, p. 105.

⁶ *D. A. f. klin. Med.*, 1891, s. 382; *ibid.*, 1894, s. 141.

⁷ *Thèse de Paris*, 1893.

⁸ *Lancet*, 1895, Vol. II., p. 287; *ibid.*, 1892, Vol. I., p. 677.

⁹ *Ann. de l'Institut. Pasteur*, 1897, t. XI., p. 97.

¹⁰ Barié: *Revue de Méd.*, 1884, Vol. IV., p. 1. Huchard: *loc. cit.*

¹¹ *Amer. Jour. Med. Sci.*, 1904, Vol. CXXVII., p. 391; *J.H.H. Bull.*, 1904, Vol. V., p. 323.

from an attack of enteric fever. He found that the average systolic blood pressure of these individuals was appreciably higher than that of healthy persons of the same age, the increase being perceptible at all periods of life ; that the systolic pressure was in many instances appreciably above the limits of what is usually regarded as normal ; that the radial arteries were palpable in a proportion nearly three times as great as that found in control observations upon supposedly healthy persons who had never had the disease ; and that the average size of their hearts, on re-examination, was greater than what it had been at the time of admission into hospital.

In some further investigations which were made by Brush and himself,¹ they note that in 21 of 52 post-mortems in enteric fever, "fresh" patches of atheroma were visible on the aorta, and in 13 out of 62 post-mortems, "fresh" atheroma was visible on the coronary arteries. They have also investigated the condition of the radial arteries in large groups of patients suffering from many different diseases, and found that the radials were palpable considerably more often in patients who had previously suffered from infective disease than in those who had not, and that this obtained at all ages. Rheumatism seemed the most important infection after enteric fever.

The influence of the infections in these directions is however, they consider, less important than some other causes. A history of laborious occupation was far more commonly an antecedent condition, and alcoholism occupied an intermediate place, though much nearer to the latter than to the infections.

Wiesel² has recently been investigating the condition of the vessels in enteric fever. He states that the elastic tissue of the middle coat is usually degenerate, and that periarterial fibrosis may be found in the cardiac muscle.

It is impossible in this article to sum up the whole matter in a judicial manner, but the following facts seem to be established.

Arterial damage may result from many and varied causes. Continued high blood pressure invariably, in time, affects the vessels, and this is one of the most important causes of widespread disease. High blood pressure may be secondary to

¹ *Jour. Amer. Med. Assoc.*, 1904, Vol. XLIII., p. 726.

² *Lancet*, 1904, Vol. I., p. 1612.

renal lesions, or may originate without any renal flaw. It is in the latter case the result of alimentary wrong-doing. Excess, relative or positive, of the food stuffs or of alcohol, intestinal fermentation or putrefaction, hepatic, pancreatic or gastro-intestinal insufficiency, may thus all be the initial fault.

The arteries may be damaged in various intoxications ; the metallic poisons (lead, mercury, &c.) comprise one group, and the bacterial toxins (rheumatism, enteric fever, &c.) another. Bacteria themselves may be found in early lesions. Syphilis is a frequent cause of local lesions.

Severe continued physical exertion, however it may act, is probably also a causal factor.



REVIEW OF RECENT NEUROLOGICAL LITERATURE.

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CEREBELLAR TUMOURS.

IN the great advance that has been made of late years in the accurate localisation of disease in the central nervous system, by means of clinical and pathological data, together with experimental results in animals, in no region has greater accuracy been attained in the recognition of the symptom-complex produced by disease than in the cerebellum. Not only is it now possible to diagnose, with almost unfailing accuracy, the presence of a tumour in this region, but an ever increasing number of such tumours and cysts have been successfully operated upon and removed, with the resulting preservation, in many cases, of useful lives. A careful analysis of forty cases of tumour which involved the cerebellum, either directly or indirectly by pressure, has been recently published by Grainger Stewart and Holmes,¹ and a similar paper by Gordinier, based, however, on only three cases, add much to the clearness of the mental picture of cerebellar disease. In Stewart and Holmes's series, twenty-two were confirmed either by operation or by autopsy, and they divide their cases into two classes, (a) those in which the tumour was limited to the substance of the cerebellum, and (b) those in which the growth was extra-cerebellar, that is to say, lying in the posterior fossa in the angle between the pons and the cerebellum. These tumours generally grow either from the flocculus or ventral surface of the cerebellum, or from one of the cranial nerve sheaths, especially the auditory, or the trigeminal. Headache is an early and almost constant symptom in both extra and intra-cerebellar neoplasms. The pain is generally most intense in the occipital region, and often radiates down the back of the neck to between the

¹ "Symptomatology of Cerebellar Tumours." *Brain*, 1904. Part 4, p. 522.

shoulders, causing a reluctance to moving the head. Indeed, this sign, in association with the coarse nystagmus so often present, the writer of this article considers most suggestive of cerebellar lesion. Optic neuritis is almost constant, usually very intense, and of greater severity and leading to blindness first in the eye on the same side as the lesion. Vertigo is one of the most constant symptoms both of extra and intra-cerebellar tumours, more particularly of the former. The type of the vertigo may be diagnostic. In both intra- and extra-cerebellar tumours the objective vertigo, or sense of displacement of external objects seen, is from the side of the lesion to the opposite side; thus, with a left-sided tumour, the apparent movement of objects is from left to right. In intra-cerebellar tumours, the subjective rotation of self is always from the side of the lesion to the healthy side, that is, in the same direction as the objective vertigo. In extra-cerebellar tumours the subjective rotation of self is always from the healthy side towards the side of the lesion, that is, in the opposite direction to the objective vertigo. The direction of the subjective movements was so constant that the authors regard it as one of the most serviceable diagnostic points. Tinnitus they found fairly frequently in extra-cerebellar tumours, always referred to the same side, whereas, in intra-cerebellar tumours, tinnitus was rarely prominent, and was not referred to either ear, resembling the tinnitus met with in other intracranial neoplasms, and due to the general increase of intracranial pressure. Convergent strabismus, due to varying degrees of external rectus palsy, is very frequent. It may be bilateral, though most marked on the side of the lesion. Some weakness of the conjugate lateral movement towards the side of the lesion is also frequently seen, especially in those blind from post-neuritic atrophy, in whom the eyes are often, while at rest, constantly deviated to the side opposite the lesion. Skew deviation of the eyes sometimes occurs, the eye on the side of the lesion being turned downward and inward, the other being turned outward and slightly upward.

Nystagmus is one of the most valuable localising signs, and is almost invariably present at some period in the case. Typically, it consists of slow deliberate jerking movements to the side of the lesion, on looking in that direction, with

gradual recession of the eyes towards the middle line; on looking to the other side, the movements are of smaller range, and occur more rapidly. The trigeminal nerve may suffer, especially in extra-cerebellar tumours, as may the facial and auditory nerves. *Hemiparesis* of the limbs and trunk muscles is a definite symptom of unilateral cerebellar tumour. It is not always present, and the proximal and distal muscles of the extremities are equally involved. This unilateral paresis in cerebellar disease never involves the face, and it is present on the same side as the lesion. Associated with it, is often a defect of tone in the weak muscles, and the absence of any spastic rigidity, and the normal state of the superficial reflexes are strongly against the weakness being due to any interference with the functions of the pyramidal tracts. This form of weakness is less often seen in extra-cerebellar tumours, while, on the other hand, spastic paresis of the limbs of the opposite side, with the ordinary changes of the reflexes of organic hemiplegia, in these cases is due to direct pressure on the pons. Due to this condition of hypotonia is the absence of recoil in a limb, when the resistance to a movement is suddenly removed, whereas in a spastic limb the amount of recoil is excessive. This absence of recoil is attributed to the inability of the antagonistic muscles to react in tone to the sudden strain to which they are exposed. *Ataxy* of the well-known cerebellar type is seen in the limbs on the same side as the lesion, more marked in the arm than in the leg. The individual muscular contractions in a movement are ill-judged, being generally in excess of the requirement, and inaccurately associated in time, the result being that the purposed act is only attained after several deviations from the direct line of movement. This ataxy appears only in active movement of the limb, does not increase towards the completion of the action, and, finally, the limb remains steady when its object is attained. Indeed there is an unnatural steadiness of the arm when held out straight, which may be held steadier than the arm on the opposite side to the lesion. In extra-cerebellar tumours, the arms are often very tremulous. The reeling gait is probably due in great measure to the irregular action of the trunk muscles,

The authors have carefully investigated the sign, described by Babinski as pathognomonic of cerebellar disease, and which he has clumsily named "diadococinesia." It consists in the inability of the patient to accurately perform rapid alternate movements with the limb on the side of the lesion. It is tested by making the patient pronate and supinate the forearm in rapid succession; this can be done naturally by the limb on the opposite side, but only slowly and awkwardly by the limb on the same side. They have not found it constantly present, and they do not agree with Babinski that it is pathognomonic of cerebellar disease.

The attitude in which the head is held is often characteristic of cerebellar disease. The head is held slightly flexed to the side of the lesion, and rotated so that the chin is directed towards the opposite shoulder. This attitude of the head may be met with in any sub-tentorial growth. The gait in cerebellar disease shows a tendency to stagger and stumble to the side of the lesion, with a constant tendency to a deviation towards that side. The patient is fully conscious of this tendency, and almost invariably attempts to correct it. When the disease has lasted for any considerable time, especially when the patient is daily up and about, there may be even an over-correction of the original deviation, so that he tends from the direct line towards the healthy side. This is seen on those days when the patient's gait is better than usual, and if this over-correction is not fully recognised as such, it may lead to misinterpretation and wrong localisation.

The deep reflexes are very variable, the knee and ankle jerks being sometimes increased, at others diminished or lost. A diminution on the side of the lesion is perhaps the most common condition, except in tumours of the middle lobe, when there is generally an increase of the deep reflex on both sides. In uncomplicated intra-cerebellar lesion, there is never an extensor plantar reflex, though it is not uncommon in extra-cerebellar tumours where there is compression of the pons, in the later stages.

In summarising the differential diagnosis between intra and extra-cerebellar tumours, the authors affirm, that in intra-cerebellar tumours the cardinal symptoms of intracranial neoplasm, headache, vomiting, and optic neuritis, appear early

and in pronounced degree, while in cases of extra-cerebellar tumour any or all of them may first occur late in the history of the case. In the former class the functions of the sixth, seventh and eighth cranial nerves may be impaired, but always in slight degree. In extra-cerebellar tumours the affection of these nerves has been invariable and often considerable. The trigeminus is rarely damaged in intra-cerebellar tumours, though frequently in the extra-cerebellar group. The character of the vertigo, if present, as before stated, may be a useful aid in localisation.

Forming, in some respects, a complementary to the previous paper, an interesting article by Collier¹ shows that local signs, appearing late in the course of intracranial tumour, where general signs alone have pre-existed, are often of false portent. (2) The relative frequency with which local signs have been due, in a series of 161 cases of cerebral tumour, to the presence of vascular lesions, meningitis, hydrocephalus, local spreading oedema of the brain, secondary deposits of new growth, and degeneration of the posterior columns. (3) That the absence of usually accepted local signs, during the early days of illness, in intracranial tumour is in itself a most important localising indication, confining the disease to the supra-tentorial region. (4) That true localising signs, at one time present, may later become concealed or undemonstrable owing to the development of other signs, and that in cases, which come under observation for the first time later in the disease, diagnosis may be difficult, erroneous, or impossible. The author's meaning will be best illustrated by quoting at length one of his cases— "A man, æt. 20, suffered with headache, vomiting, and optic neuritis. Seven months after these symptoms appeared, he was totally blind from post-neuritic atrophy. In the fifteenth month of his illness localising signs began to appear. In the seventeenth month, his condition was as follows: Paralysis of left external rectus. Marked nystagmus with the slow movement to the left. Complete nerve deafness of the left ear. Left peripheral facial paralysis. Left cerebellar position of head (head inclined to left shoulder, and face rotated to right). Marked head retraction during paroxysms of pain. Bilateral

¹ "The False Localising Signs of Intracranial Tumour," *Brain*, 1904. Part IV., p. 490.

ataxy, L > R, with lurching to left on attempting to walk. Knee-jerks, left normal ; right, diminished. Bilateral extensor plantar reflex. His condition remained unchanged until death three months later." The localising symptoms were apparently conclusive of a growth in the left posterior fossa involving the cerebellum and the sixth, seventh and eighth nerves. The autopsy revealed a glioma of the left prefrontal region. The cranial nerves seemed normal to the naked eye, but the intramedullary portion of the left eighth nerve showed degeneration. The cerebellum was much indented by the edge of the foramen magnum, the left lateral lobe forming more of the pressure cone than the right. In many cases of intracranial tumour of long duration, it is found post-mortem, that the posterior and inferior parts of the cerebellum have become pushed down and backwards into the foramen magnum, and the medulla itself being somewhat caudally displaced, the two structures together forming a cone-shaped plug tightly filling up the foramen magnum.

False localising signs were met with in 12·5 per cent. of the series of 161 cases, occurring either singly or in combination, as follows :—(1) Paralysis of cranial nerves ; (2) Hemianopia ; (3) Jacksonian epilepsy ; (4) Bilateral spastic paresis ; (5) Cerebellar signs. He entirely denies the theory that either olfactory or auditory neuritis, in any way comparable to optic neuritis, occurs in intracranial tumours. Cranial nerve palsy was present in only 10 per cent. of his series of 161 cases, indeed in only two out of the last 69 cases. He suggests that this may be due to the fact that cases of intracranial tumour are operated on earlier and more frequently than formerly. Speaking of convulsion in connection with brain tumours, he remarks : "It is, I think, a very commonly accepted fallacy that local convulsion is a sure sign of local gross lesion of the cerebral cortex." Surely he forgets how common unilateral convulsions are in uræmia. He continues, that the commonest cause of Jacksonian convulsion is probably idiopathic epilepsy, while a minority of cases are due to local gross disease of the cerebrum. On the other hand, many patients with symptoms apparently conclusive of idiopathic epilepsy have later on developed symptoms of intracranial tumour. He concludes that the occurrence of local convulsion of hemi-epilepsy and of

general convulsion, when presenting for the first time, long after the general signs of intracranial growth have appeared, is to be disregarded as a localising sign. It is the result of secondary hydrocephalus, and the latter may result, no matter where the growth may be situated within the skull. Slight bilateral spasticity is not infrequently an indication of the existence of such ventricular distension. The question as to whether signs, significant of cerebellar lesion, result from the distortion of the posterior parts of the lateral lobe of the cerebellum, in the formation of the pressure cone, in cases of long standing intracranial tumour, is one of great difficulty. In many such cases, nystagmus is met with, unilateral or bilateral ataxy may occur, the patient's gait and attitude may suggest cerebellar disease, and he may fall constantly in a particular direction, and, in such cases, no other abnormality of the cerebellum has been found. As the result of the examination of a large number of cases of cerebellar tumour, he is of opinion that tumours of the cerebellum rarely fail to show the signs of cerebellar involvement early in the course of the case. The same holds goods for all cases of subtentorial growth, that they give early localising signs, with the distinct exception of some cases of glioma confined to the pons. While diagnosis should not be difficult in the early stages of cerebellar tumour, it may be very difficult in cases seen for the first time when the disease is of long standing. The signs of cerebellar disease may be called dynamic signs. It is necessary, for their proper elicitation, that the patient be in the possession of his mental faculties, and of his power of voluntary movement. He must be able to sit up, to move his limbs, to stand, and to walk, and to attend intelligently to command. In a case of long duration, as a general result of intracranial pressure or of ventricular distension, mental deterioration, physical weakness, blindness from optic neuritis, and bilateral spastic paresis may conceal the cerebellar signs more or less completely, while the occurrence of hemiplegia, or of double hemiplegia from extension of the growth into the brain stem, or from pressure upon this region, effectually conceals the cerebellar signs in the region of the paralysis. Lastly, rapidly spreading cerebral oedema from the region of the growth may be the cause of urgent and rapidly fatal symptoms.

TRANSVERSE LESION OF THE CORD.

The same writer¹ has also published an important analysis of the effects of total transverse lesion of the spinal cord in man, in eight cases of total, and seven other partial transverse lesions of the cord. Not only are the knee-jerks and other deep reflexes permanently abolished in the region supplied by the caudal segment of the divided cord, but, in addition, the muscles waste and lose their faradic excitability. The sphincters also lose their tone, constant dribbling, with a contracted bladder, the only sign of self-action remaining in the isolated part of the spinal cord being the occasional presence of an extensor plantar reflex. These phenomena occur in the absence of any recognisable structural change in the ventral horn cells, ventral roots, and peripheral nerves of the paralysed region. This condition in man is comparable to the condition of "isolation-alteration" described by Sherrington in monkeys, in which, although spastic paralysis is present for several weeks after total transection of the cord, this lessens as time elapses. Clinically, a physiological total transverse lesion is considered to exist when there is absolute loss of sensibility, complete flaccid paralysis and loss of the deep reflexes. This condition may be present, without actual death of the nerve elements at the site of the lesion, and may be recovered from. The first sign of such recovery is the return of the knee-jerk, and a gradual change from the flaccid to the spastic state. Sensibility returns in the order, touch, pain, temperature; and the lowest sacral segments usually become sentient before the others. The first signs of such return are often that the patient becomes conscious of the act of micturition, or of catheterisation, or of distension of the bladder during the routine lavage. Voluntary power returns in the flexors earlier than in the extensors, flexion of the toes invariably returning first. In cases where recovery is complete, the plantar reflex does not resume the flexor type, till some time after the patient has completely recovered the use of the lower limbs. The author further suggests that the mode of slow return to a spastic state in some cases, several months after the occurrence of a total physiological

¹ "The Effects of Total Transverse Lesion of the Spinal Cord in Man." *Brain*, 1904. Part I., p. 38.

lesion, together with his anatomical findings, seems to point to such partial recovery being due to regeneration of the fibres within the spinal cord, rather than to any incompleteness of the lesion.

COMPRESSION PARALYSIS.

Marinesco (*Rev. Neurologique*, 1904, No. 5, p. 210) describes two cases of flaccid paralysis due to compression of the pyramidal tracts, without any degeneration in these tracts, with the presence of Babinski's sign, and absence of the tendon and other cutaneous reflexes. In case 1, a woman, æt. 50, there was a sudden onset of L. hemiplegia, with slight hemianæsthesia, and hemianopia, without loss of consciousness. Conjugate deviation of the head and eyes to the right. Complete flaccid paralysis of the left arm. Could move the left toes a little, but no other movement. Left plantar extensor, but all other cutaneous and deep reflexes absent on the left side. Incontinence of both sphincters; no rigidity or fits. Died 41 days later. At the autopsy was found extensive cerebral softening, involving the cuneus and 1st and 2nd occipital convolutions, the posterior part of the 1st temporal, the optic radiations, the external capsule and island of Reil, and portion of the corpus striatum. The lateral ventricle was dilated, but the internal capsule was normal, as was the motor cortex and the giant cells in the ascending frontal convolution by Nissl's method. Sections of the cervical, dorsal, and lumbar cord by Busch's modification of the Marchi method showed no trace of descending degeneration. In case 2, a youth, æt. 16, died probably of general paralysis after several months' illness. The sensation was good. Deep reflexes absent, but extensor plantar. At the autopsy was found pachymeningitis from the 1st to the 7th cervical segments. There was no degeneration in the cord or nerve roots, either ascending or descending. No chromatolysis in the giant cells of the motor cortex by Nissl's method. He argues from these pathological findings that the symptoms produced by the compression of the pachymeningitis were purely functional (due to nutritional disturbance), with no destruction of the neurofibrils. Moreover, simple compression of a nerve, without destruction of the axis cylinder, causes no *réaction à distance* in the nucleus

of that nerve. This reaction, when present, indicates always a solution of continuity in the nerve fibrils. Bethe (*Allgemein. Anat. u. Phys. des Nervensyst.*, 1903) has shown, in experiments on compression of a nerve, that the conductivity of the nerve fibrils is associated with the presence of an acid, and the absence of this acid causes loss of conductivity.

PATHOLOGY OF THE EXTENSOR PLANTAR REFLEX.

In these cases the nerve fibres lose their staining reaction with Bethe's special method. Marinesco did not stain his sections by this method, but says that the paralysis and disappearance of the superficial and deep reflexes in his cases would only be explained by chemical alterations in the neuro-fibrils. He further asserts that his cases with absence of degeneration below, or chromatolysis above, prove that the symptoms were due to simple compression of the pyramidal fibres, that is to say, that flaccid paralysis, with loss of deep and superficial reflexes and an extensor plantar reflex, may coincide with a slight lesion causing no actual destruction of the fibres. Marinesco, therefore, argues that Babinski's extensor plantar reflex is indicative, not of an actual lesion of the pyramidal fibres, demonstrable by present methods, but of an alteration in their conductive power. Kornilow and Schamschin (*Deut. Zeit. f. Nervenheilk.*, 1903, p. 216) come to the conclusion that even a very marked extensor plantar reflex may exist in the absence of any pyramidal lesion, and is indicative only of functional disturbance of the pyramidal fibres. Thus, they have observed the sign in a case of typhoid fever, where there was no pyramidal lesion, and it similarly appears in the normal adult during sleep. As further illustrating the fact that the extensor plantar reflex depends only on functional alteration and exhaustion of the cortex, compare its merely temporary occurrence after an epileptic fit. Harris, in 1903 (*Rev. of Neur. & Psych.*, May, 1903), described two cases of hysterical paralysis, one paraplegic, the other hemiplegic, in whom there was present, for a week or more, typical bilateral extensor plantar reflex, changing to flexor after the paralysis had been completely and rapidly cured by appropriate treatment.

According to Goldflam (*Neur. Centralbl.* "Zur Lehre von den Hautreflexen," &c.), the normal plantar reflex is a cortical

reflex, through the peripheral nerve, posterior root, posterior columns, and their nuclei, fillet, opposite paracentral lobule, and again, peripherally, by the pyramidal path, to the anterior horn cells in the second sacral segment. If this reflex path is interfered with at any point in its course beyond the posterior roots down to the origin of the anterior roots, or if the function of the cortex is diminished, as in natural sleep, then plantar excitation stimuli follow a different path, and there is now purely a spinal reflex, by the posterior roots and by the collateral branches to the spinal centre for the extensors of the toes. Goldflam's opinion agrees entirely with that previously put forward by Schneider, and by van Gehuchten, and is concurred in by Marinesco.

INFANTILE PARALYSIS.

Batten discusses the pathology of infantile paralysis (acute anterior poliomyelitis)¹ in the light of three cases with autopsy, one of which died on the thirteenth day after the onset of the disease. He remarks that the view that is most commonly held of its pathology is that the condition is due to an acute inflammation, which may be of bacterial origin, or may be due to some form of poison of unknown origin, having an especial selective action on the anterior horn. His three cases, he is of opinion, prove the truth of a view which is held by but few observers, that the condition is directly due to thrombosis, or embolism of a branch of the anterior spinal artery. In the cord of the child who died fourteen days after the onset of the disease, the acutest inflammation was present in the gray matter of the anterior horns, with a large amount of small round cell exudation, hæmorrhages, and thrombosis of vessels. In the second case, an area of necrotic tissue, limited to the anterior horns in the lumbar and sacral regions. In the third case, a diminution in the size of the anterior horn of the affected side due to cicatricial contraction.

Is the condition due to a primary inflammation, followed by a thrombosis of vessels, or is it primarily due to a thrombosis of vessels followed by inflammatory changes and hæmorrhage? Head and Campbell have argued strongly in favour of the former theory, asserting that occlusion of the vessels of the

¹ "The Pathology of Infantile Paralysis," *Brain*, 1904. Part III., p. 376.

cord, though followed by marked chromolytic changes in the cells, does not produce inflammatory change or hæmorrhages. Batten, in reply, instances the infarction of small vessels with fine tobacco seeds, by means of which, in various organs, hæmorrhages and exudation of cells were found as the early results of the obliteration of small vessels. He summarises his views on anterior poliomyelitis as follows:— (1) That the condition is due to a primary thrombosis of a branch or branches of the anterior spinal artery supplying the gray matter of the anterior horn. (2) That such thrombosis may be produced by many and various forms of infection, and the disease is not due to a special specific infection. (3) That the condition is more likely to occur in the lumbar region, owing to the blood supply of this portion of the cord being at a point most distal from the heart, and the long course of the reinforcing arteries along the spinal roots.

A case of successful treatment of a case of infantile paralysis by Nerve Suture has been recorded by Harris and Low.¹ A child of two years was attacked by infantile paralysis, which left complete paralysis of the right deltoid and spinati muscles. These wasted rapidly, with electrical reaction of degeneration. The biceps and other arm muscles were unaffected. At the operation, the fifth cervical nerve was split in halves, and the upper bundle, which caused no muscular contraction on faradic stimulation, save fibrillary movements in the deltoid, was cut across as near the foramen as possible, and turned down in front of the remaining half of the fifth nerve, and then sutured into a nick, cut in the front of the sixth cervical nerve. The uncut portion of the fifth nerve contained the fibres for the biceps, as faradic stimulation of this bundle caused powerful flexion of the forearm. In this way the degenerated bundle in the fifth nerve, supplying the deltoid, was sutured on to a healthy nerve, so as to allow regeneration to take place by the formation of a connection with the healthy fibres in the sixth nerve. For six months after the operation no sign of improvement appeared, in spite of regular massage and galvanism. Then, eleven months after the onset of the paralysis, slight improvement in the power of the shoulder was noticed, and the progress, at first slow, afterwards more rapid, was main-

¹ Paper read before the Clinical Society of London, October, 1904.

tained, so that ultimately the child could put up her arm readily straight above her head.

CEREBRO-SPINAL MENINGITIS.

The recent epidemic of cerebro-spinal meningitis in the States and in Germany adds interest to a paper by Elsner¹ on the symptoms and diagnosis of this dread disease. Responsible annually in the State of New York in the previous ten years, for an average of 200 deaths, in the first eleven months of 1904, no less than over a thousand deaths were caused by it. Such epidemics of cerebro-spinal fever have usually been characterised by the remarkable limitation of the ravages, the small number originally attacked, and the high mortality. Pneumococcal meningitis is more virulent than is the form of the epidemic disease due to the meningococcus intracellularis of Weichselbaum, nearly every case of the former succumbing, while only one-third of the meningococcus cases died. Though Kernig's sign was present in 90 per cent. of his cases, he concludes that it is by no means pathognomonic of cerebral or cerebro-spinal meningitis. The author holds that "the pneumococcus as certainly causes cerebro-spinal meningitis as it does malignant endocarditis, and both of these fatal infections without pulmonary complications, and that pneumococcal meningitis may follow distal infection. Tubercular meningitis is to be distinguished by the long prodromal period, the common absence of leucocytosis, the frequent cranial nerve paralysis, the absence of other cases, and the results of lumbar puncture. The identity of the posterior basic meningitis, described by Still in young children, running a subacute course, and in which he isolated a diplococcus resembling the diplococcus of Weichselbaum, with epidemic cerebro-spinal meningitis, has been established by Koplik. This observer describes an epidemic of thirty cases of cerebro-spinal meningitis, eight of which were typical cases of posterior basic meningitis, six of them in infants under two years of age. In all the cases below two years of age, the onset was sudden, with one exception, fever and vomiting being followed by rigidity of the neck and, in some cases, by convulsions. The children were emaciated, with head retraction, and rigid abdomen, bulging

¹ *Albany Medical Annals*, March, 1905.

fontanelles. No optic neuritis, but squint present in some. Kernig's sign of little value on account of the age of the patient, and the tendency to rigid flexor contraction. No extensor plantar reflex, as a rule. The temperature simulates that of tuberculous meningitis, often not rising above the normal until near the end of the case. Leucocyte counts low. In three of the cases the meningococcus was found on lumbar puncture. Chauffard and Baudin, in an analysis of 223 cases of lumbar puncture in a general hospital, found that only in exceptional cases did headache ensue as a sequela; in three cases there was vomiting. No further complication of any sort occurred. This record is of value, inasmuch as certain warnings have been issued against the procedure, on account of the danger of the withdrawal of fluid too rapidly causing meningeal cerebral hæmorrhage. This untoward result is to be explained on account of the brain being contained in a closed cavity, and the rapid withdrawal of fluid from its ventricles, by means of lumbar puncture, necessitates the immediate filling of the potential vacuum, thus causing either oedema or cerebral hæmorrhage. The headache, sometimes severe, which may follow lumbar puncture, is probably due to such small hæmorrhages occurring into the meninges. Still, carefully performed, and the fluid allowed to drain slowly, if more than a small quantity is to be taken, the operation will safeguard against any untoward event.

Southard and Keene (*Amer. Jour. of Med. Sci.*, March, 1905) describe six cases with autopsies of acute hæmorrhagic encephalitis, due to the *Staphylococcus pyogenes aureus*. Intrapulmonary injections of cultures of this organism in guinea-pigs produced, in from 24 to 48 hours, a similar encephalitis, without clinical reaction.

In the same journal Barrett describes a careful study of a case of disseminated syphilitic encephalitis, which occurred soon after infection. Death occurred eight months after infection.

EXOPHTHALMIC GOITRE.

Josionek¹ has described two cases of Graves' disease successfully treated with the antithyroid treatment of Moebius. This drug is prepared by E. Merck of Darmstadt, from thyroi-

¹ *Med. Woche*, 1904, No. 37.

dectomised sheep, and contains 5 per cent. of phenol for preservation. Recent cases are more readily influenced than old ones. Both Josionek's cases showed the classical symptoms of proptosis, tachycardia, and goitre, tremor, restlessness, and insomnia. One patient, a man, æt. 54, first noticed the symptoms two months prior to treatment. Given at first 15 grains twice daily, the dose being afterwards doubled, he took, in a fortnight, about an ounce of the drug. At the end of this time the thyroid became distinctly softer, the size of the neck diminished by $2\frac{1}{2}$ inches, the tremor almost disappeared, there was hardly anything abnormal in the position of the eyeballs, the pulse rate was reduced to 78, sleep was good, and the general condition and spirits of the patient excellent.

HYSTERICAL VOMITING.

Parkes Weber, in a paper on Fæcal Vomiting and Reversed Peristalsis in Functional Nervous Disease (*Brain*, 1904, Part 2, p. 170), describes a case of obstinate vomiting, in which at various times scybala, oil enemata, and enemata coloured with methylene blue to avoid deception, were vomited by the mouth, as soon as ten minutes after the administration of the latter. Reviewing the literature of the subject, he describes a typical case: "The patient, generally a young woman, but sometimes a man or child, may seemingly be in blooming health before the attack. Some distressing mental emotion or other physical or psychical shock is followed by a period of great constipation, accompanied by meteorism (hysterical tympanites), and abdominal pains. There may be severe attacks of vomiting, and even some hæmatemesis. The constipation becomes absolute, and the other symptoms get worse, and finally the condition of "hysterical ileus" is reached. Then everything taken by the mouth is returned. The vomit becomes fæcal in character, and even pieces of formed fæces may be ejected by the mouth. Enemata and suppositories may likewise be vomited. Hysterical symptoms, such as hemianæsthesia and concentric contraction of the visual fields, are likely to be found, if sought for, and there may be occasional hysterical fits or attacks of hystero-epilepsy. Once started, the symptoms may continue for weeks or months, with irregular remissions or intermissions, and then gradually or

rapidly subside, either spontaneously or under bromides, strict isolation, and anti-hysterical treatment. An exploratory laparotomy perhaps, sometimes, not always, may exert a favourable influence by suggestion. Recurrence after a longer or shorter interval is to be expected, and other severe hysterical conditions, including the mental state leading to "hysterical malin-gering." It is certain, in spite of what surgical text-books say, that the most typical cases of fæcal vomiting are due, not to organic obstruction in the large intestine, but to intestinal contraction and antiperistalsis of nervous origin. The vomiting of formed fæces rather points to a case being one of functional nervous origin, while in the so-called "fæcal vomiting" of organic obstruction the vomited material is generally only fæculent, that is to say, there is only sufficient admixture of fæces to give the vomit a smell of fæces.



THE WORK OF THE PANCREAS.

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RECENT studies of the pancreas both in its physiological and pathological relations have led to a better comprehension of the work of this organ. Although it provides the most active digestive secretion in the body, and plays an important part in general metabolism, it is still true that, as Opie says, "disease of the pancreas is rarely recognised during life." A consideration of the way in which the pancreas does its work may enable us to realise the difficulties attending this recognition, and the steps by which they are being overcome.

Pancreatic Infantilism.—To the inadequacy of the pancreas Byrom Bramwell has referred a type of persistent infantilism.¹ A lad of 18, who did not look more than 11, came under his observation. He was perfectly formed, bright, and intelligent. His height was 4 feet 4 inches, and his weight 4 stone 7½ lbs. He had suffered from chronic diarrhoea for nine years. The abdomen was swollen and tympanitic. Skiagraphs showed that the epiphyses which should have closed between 16 and 18 had not done so. There was no glycosuria. The pancreatic secretion was found to be defective or absent by tests described later. Under treatment by a glycerine extract of the pancreas a very marked improvement occurred. The diarrhoea was greatly diminished; he grew 5½ inches in two years, and increased 1 stone 8 lbs. in weight, although previously he had not grown for eight years. He developed signs of puberty, till then entirely lacking.

Here profound disturbances resulted from pancreatic inadequacy—yet there was no glycosuria, suggesting that the influence of this gland on metabolism is by no means limited to regulating the consumption of carbohydrates by the tissues.

I recently saw a case under the care of my colleague, Dr. Haig (by whose kind permission I refer to it), in a boy of 16, of severe congenital syphilis combined with persistent

infantile features. In appearance he looked about 8 or 10 years old, and all signs of puberty were lacking. Now, congenital syphilis is known to lead to arrested bodily development, but the special feature of interest here was the existence of fatty diarrhoea, suggesting pancreatic inadequacy. At the *post-mortem* examination, the typical condition of the pancreas in congenital syphilis was found, as described later. As in Bramwell's case, there was no glycosuria.

WHY DOES THE PANCREAS NOT DIGEST ITSELF?

To this riddle we are now provided with a definite answer. The tryptic activity of the pancreas is hedged around with some remarkable safeguards.

(i.) *Active Trypsin is normally only liberated in the presence of Food.*—Bayliss and Starling² have clearly proved that the contact of hydrochloric acid with the epithelial cells of the duodenum (and, to a less extent, of the jejunum) causes in them the production of a body (*secretin*) which is absorbed from the cells by the blood stream, and carried to the pancreas, where it acts as a specific stimulant to secretion.

This result is so important that it is well to recall how it was arrived at. Dilute hydrochloric acid was placed in a loop of jejunum which had been previously isolated from the rest of the body except for its blood supply. The absorption of acid was accompanied by a secretion of pancreatic juice. If, however, the acid were injected direct into the blood stream, it was ineffective. On the other hand, a saline extract of the intestinal mucosa treated with hydrochloric acid and injected into the blood stream produced an active secretion. Thus for pancreatic secretion to occur normally, hydrochloric acid must descend from the stomach, which will only happen in the presence of food. And hyperacidity of the duodenum with consequent hypersecretion of pancreatic juice is prevented, for von Mering³ has shown that injection of acid into the duodenum leads to closure of the pyloric orifice. Not until this undue acidity has been neutralised by the pancreatic juice it has produced can more of the acid contents of the stomach pass through the pyloric sphincter. In this way the secretion is exactly regulated to the amount of food to be dealt with.

In the second place, fresh pancreatic juice contains inactive

trypsinogen. Before this can become active trypsin, it must be acted upon by another ferment, *enterokinase*, which appears to be present only in the succus entericus. Therefore the fluid present in the duct of Wirsung cannot possibly injure the gland, for it is inactive until discharged from the papilla. And although any mechanical irritation of the intestine will lead to its pouring out mucus, true succus entericus is only secreted in the neighbourhood of the food, while its richness in enterokinase depends on the stimulating presence of the pancreatic juice.⁴ Indeed, Starling finds that the intestinal mucosa of a fasting animal will not yield enterokinase.

To summarise. The acid of the gastric juice stimulates the flow of a pancreatic juice, which is inert towards proteids until acted upon by an intestinal ferment, for which the pancreatic juice itself is the specific stimulus. This ensures that under normal conditions active trypsin can only be liberated in the presence of food.

The importance of these safeguards is seen on injecting secretin into fasting dogs. Under these experimental conditions active pancreatic juice is set free, and the intestinal walls are extensively digested.

(ii.) *Trypsin is an unstable body, and rapidly destroys itself, if proteids or their products are not present.* In this way the surplus trypsin left over at the end of digestion is soon disposed of.

(iii.) *The blood serum contains "anti-bodies" to trypsin (Weinland⁵), and enterokinase (Bayliss and Starling⁶), thus destroying any of these ferments which might have become accidentally introduced into the circulation.** This anti-body appears in the case of trypsin to be connected with the serum albumin rather than the serum globulin.⁸

For these reasons, we cannot believe that pancreatic hæmorrhage or necrosis can be due to self-digestion of the gland.

Fat Necrosis.—With regard to steapsin the case is different ; should the juice be extravasated from the gland, digestion or

* It is interesting to note that intestinal worms contain an anti-body to enterokinase, and not to trypsin. (Dastre and Stassano, *Arch. internat. de Phys.*, I., p. 86, 1904.) By thus preventing the trypsinogen from becoming activated they attack the very foundations of pancreatic digestion, which explains the digestive disturbance they cause.

the body fat will follow. It is agreed that "fat necrosis" is due to this splitting of the body fat into glycerine and fatty acid, the latter combining with lime salts. Flexner has demonstrated the presence of steapsin in the affected areas, while Opie⁹ was able to show its presence in the urine in one such case by its decomposing action on ethyl butyrate.

The glycerine is absorbed into the circulation and oxidised, causing increased output of carbon dioxide. Cammidge¹⁰ believes that only about half is thus oxidised, the remainder appearing in the urine as such where it can be detected by conversion with nitric, or other acid, into a glycerose. This glycerose is identified by the osazone crystals it yields with phenyl hydrazine.

On this he has founded a method which he claims will enable him to detect certain forms of pancreatic diseases. Briefly, the principle is as follows:—

Reaction A.—Urine, which has been treated with strong hydrochloric acid, is neutralised by lead carbonate and filtered. From this osazone crystals are prepared in the usual way.

Reaction B.—The urine is first treated with half its bulk of saturated solution of mercuric chloride and filtered. The subsequent procedure is as in reaction *A*. (For the many details necessary to the reactions see his original paper.)

He claims that (i.) the *A* crystals are differently soluble in a mixture of 1 part of strong sulphuric acid to 3 of water, according to the condition of the pancreas. Thus, in acute pancreatitis, they dissolve in a few seconds to half or three-quarters of a minute, in chronic pancreatitis, in half to one and a half minute, in malignant disease of the pancreas in three to five minutes.

(ii.) If *A* crystals are formed, and *B* crystals are not, it indicates an inflammatory condition of the pancreas.

These conclusions have been seriously questioned by Ham and Cleland,¹¹ who believe the crystals are due to a compound of the lead salt used in neutralising the acid. This Cammidge denies, as he has obtained the reaction after using other acids and neutralising agents. So far other observers do not appear to have got the diagnostic results claimed for this reaction. At St. Bartholomew's Hospital the results yielded by it were disappointing.

Were amyllopsin to enter the circulation, its starch-digesting capacity would be ineffective. It can also digest glycogen, of course, but this cannot account for pancreatic diabetes, since the glycosuria does not cease with the emptying of the glycogen reservoirs, and is intensest after total excision of the organ.

ADAPTATION OF THE PANCREAS.

The secretion of the pancreas is remarkably adapted to the character of the food. Thus a meal of bread causes the secretion of a juice rich in amyllopsin, but very poor in the fat-splitting ferment, while feeding with milk leads to a juice rich in this latter constituent. In a most interesting paper Bainbridge¹⁹ has shown that not only do the enzymes, normally present, vary in amount according to the nature of the food, but an unaccustomed food may evoke its appropriate enzymes. This adaptation is chemical in nature.

Lactase, which breaks up lactose into dextrose and galactose, is normally absent from the pancreatic juice of adult dogs, yet if they are fed upon a milk diet for two or three weeks, their pancreatic juice invariably contains this enzyme. This does not occur if lactose is given subcutaneously. Strictly speaking, this adaptation is effected by the intestinal mucosa rather than by the pancreas, for, if an extract of this mucosa is made from a milk-fed dog, and injected into a biscuit-fed dog, the pancreatic juice of the latter now contains lactase. Control injections of extracts from the mucous membrane of a biscuit-fed dog are ineffective. Lactose, therefore, acts on the intestinal mucosa, causing it to produce some substance which is carried by the blood stream to the pancreas, and stimulates it to form lactase.

This would seem to bring digestive enzymes into line with "anti-bodies" in general; the contact of a substance with the tissues resulting in the production of something which destroys that particular substance. In this connection, it is interesting to note that the pancreatic juice of new-born puppies does not contain lactase, although the enzyme makes its appearance a few days after birth. It is a well-known fact that the pancreatic juice of infants contains no amyllopsin during the first few months of life—perhaps this also may be due to a process of adaptation to a starchy diet. Considering how

many children of the poor are fed, it is difficult to see how they could survive at all did they not digest some starch.

THE INFLUENCE OF THE PANCREAS ON GENERAL METABOLISM.

Since the classical experiments of von Mering and Minkowski, much interest has been taken in the relationship of the pancreas to diabetes. To briefly recall their results. Extirpation of the pancreas in dogs is followed within 24 hours by glycosuria, reaching its maximum on the third day, when it amounts to 8 or 10 per cent. on a carbohydrate free diet. This is associated with hyperglycæmia and acetonuria. The constancy of the ratio of the carbon to the nitrogen excreted (2·8 to 1) is best explained by supposing that the total quantity of the sugar formed in the body from albumin is, after removal of the pancreas, excreted by the kidneys. Though glycosuria does not follow an ordinary diet if $\frac{1}{8}$ to $\frac{1}{16}$ of the gland is left, it does if any excess of carbohydrate be given.

These facts have been variously explained as follows :—

i. *The pancreas may furnish an internal secretion to the blood or lymph which is necessary for normal metabolism, either—*

(a) A glycolytic ferment which breaks down the sugar into some simpler form in which the tissues can use it, or

(b) Something which stimulates the tissue cells to metabolise sugar.

Lépine¹³ believes, in support of the former alternative, that normal blood causes a glycolysis which diabetic blood is unable to effect ; but this conclusion is not confirmed by others.

ii. *The pancreas may destroy some product which hinders the normal assimilation of sugar.*

Allied to this is the view of Schmiedeberg, who holds that in diabetes glucose is combined in the blood in some inert compound which prevents its assimilation by the tissues.

Tuckett¹⁴ combines these two views, advancing reasons for believing that the pancreas has an internal secretion which enters the circulation constantly *via* the thoracic duct, and also that a toxic substance capable of causing glycosuria, if not neutralised by this internal secretion, is absorbed from the intestine during digestion *via* the lymph stream.

That the essential feature of diabetes is the failure of the tissues to assimilate carbohydrates is clearly shown by the following facts.¹⁵ The respiratory quotient $\frac{\text{CO}_2 \text{ expired}}{\text{O}_2 \text{ inspired}}$ is normally increased by a carbohydrate diet. In the diabetic the quotient is depressed, and is not appreciably increased by the ingestion of carbohydrates.

To assume the existence of an internal secretion of the pancreas is certainly the easiest way of accounting for the phenomena of pancreatic diabetes; but we must remember that it is an assumption. No such secretion has ever been isolated, nor have pancreatic extracts allayed glycosuria in any way. As the internal secretion passes into the circulation, and as the muscles are the great site of carbohydrate consumption, it is possible that the secretion must be further modified by the muscular tissues.

Otto Cohnheim⁷ found that, whereas extracts of pancreas and of muscle had no glycolytic action separately, mixtures of such extracts led to an enormous disappearance of sugar from its solutions. Blood-serum had an inhibitory effect on this reaction. Bacterial action could be definitely excluded. He concluded that muscle contains a sort of zymogen or inactive ferment which is activated by the pancreatic internal secretion.

Croftan¹⁶ claims to have diminished glycosuria by administering a mixture of pancreatic, hæmoglobin, and muscle extracts. He was led to try this by a similar chain of reasoning, but from Cohnheim's experiments we should expect better results if the hæmoglobin were omitted.

THE MEANING OF THE "CELL-ISLETS."

The "cell-islets" of Langerhans in the pancreas have been regarded as the source of this internal secretion. Amid all the discussion concerning these structures, there is substantial agreement on the following points. They are developed from the secreting alveoli (Laguesse), and are more numerous in the foetus and infant than in the adult (Kasahara); in reptiles they remain continuous with the alveoli (Gianelli and Giacomini); and in man, delayed development, in consequence of congenital syphilis, for instance, may lead to persistence of this embryonic

continuity. Normally they contain no ducts (Ebner), and are supplied with wide tortuous capillaries (Kühne and Lea).

Opie is a strong supporter of the view that, when diabetes is the result of pancreatic disease, injury to the islets is responsible for the disturbance of carbohydrate metabolism. He claims that the more selective the influence of a lesion is upon the islands, the more likely is it to cause diabetes. Thus interstitial pancreatitis may be interlobular or interacinar; the latter soon affects the islets which lie deep within the lobules, whereas the former has to be far advanced for the islets to become involved. Corresponding to this, he finds the interacinar form is much more frequently associated with glycosuria than the interlobular. Hyaline degeneration, too, which he describes as particularly liable to affect the islets, he believes to be specially apt to produce glycosuria.

On the other hand, Dale¹⁷ has advanced strong reasons for believing that these islets do not represent fixed and permanent structures in the gland, but are being continuously formed from secreting alveoli. By injection of secretin he has been able to imitate the normal stimulation of the pancreas, and yet to carry it to a pitch of exhaustion, which previous methods would not allow of. As a result he finds islets of such abundance and of such a size as are never seen in any part of a resting gland. Moreover, they show signs of active formation. Apart from large areas of definite islet tissue, a considerable proportion of the remaining alveoli show partial change, some cells having lost their normal staining properties, and having become assimilated to centro-acinary cells. There is frequently apparent continuity of the islets with the epithelium of the smaller ductules. The proportion of islet tissue to secreting tissue is also increased by prolonged fasting, *i.e.*, the disappearance of the stored material, whether by discharge from the duct or by absorption into blood or lymph when nutrition fails, is attended by increased formation of islet tissue.

He concludes that the islets are not independent structures, but are formed by certain definite changes in the arrangement and properties of ordinary secreting cells, bringing about a reversion to embryonic type. It may be, as Laguesse has suggested, that the passage from alveoli to islets denotes a *change in polarity*; secretion now taking place into the blood

instead of into the ducts. Dale suggests that the process of formation of islet tissue, involving absorption of zymogen granules, nuclear chromatin, and other cell constituents, may be the essential factor in internal secretion.

A study of Dale's microphotographs is certainly very suggestive, showing as they do all transitional forms between alveoli and islets. Indeed, ordinary cell islets, when prepared by Heidenhein's method, produce a distinct impression of badly staining shrunken alveoli that have lost their normal arrangement. It is, however, rather difficult to understand why they should usually lie in the centre of the lobule if produced by breaking down of ordinary alveoli.

After all, the nature of the islets does not really settle the question of internal secretion. If this exists, it does not necessarily require special cells to elaborate it. In the liver, we do not find certain bile producing cells and other glycogenic cells, but all the cells seem equally concerned in both the internal and external secretions of the gland. Noel Paton¹⁸ points out that, while the cell islets are well developed in the duck, the pancreas plays no important part in regulating the metabolism of sugar. This throws doubt upon the hypothesis that their function, even in mammals, is to regulate carbohydrate metabolism. Spriggs²² found that intravenous injections of secretin did not produce any effect whatever on a case of diabetes, though, as we have seen, the cell islets would be increased by such a procedure.

To recapitulate. Though total excision of the pancreas causes glycosuria on a carbohydrate-free diet, and partial excision results in alimentary glycosuria, there is no conclusive evidence that the cell islets elaborate an internal secretion which regulates carbohydrate metabolism, or that they form an antitoxin to a body which would otherwise cause glycosuria. Normally formed from the alveoli, they remain in connection with them under conditions of retarded development, and their formation from alveoli is greatly increased in the exhausted or starved gland.

THE MANIFESTATIONS OF PANCREATIC DISEASE.

Three main causes tend to obscure the diagnosis of pancreatic disease :—

- (i.) "Disease of the organ is seldom uncomplicated, but

is usually consequent on changes in the duodenum, liver, or tube passages" (Opie); and when not the result of such changes, it may be the cause of them.

(ii.) The digestive work of the pancreas can largely be carried out by other secretions. Digestion of fat has been thought to be an exception to this statement. But it has now been shown by Volhard, and more fully by Stadel,¹⁹ confirmed by Eddins, that even under aseptic conditions the gastric juice is capable of splitting 50 to 60 per cent. of the fat of the food into fatty acid and glycerine. This accounts for Abellmann's observation that, after excision of the pancreas in dogs, 53 per cent. of the fat of milk is still digested, and for Hédon's and Ville's, who found that 50 per cent. of fat was digested after the pancreatic juice was prevented from reaching the intestine.

Another source of fallacy is that occlusion of the main pancreatic duct may be partially compensated for by the duct of Santorini.

On the other hand, it must be remembered that occlusion of the bile duct, or alimentary tuberculosis, may result in excess of fat in the stools without pancreatic disease.

(iii.) Pancreatic disease is only one of many causes of glycosuria, and lesions which only affect part of the gland may not be accompanied by glycosuria at all.

Bearing these sources of error in mind, we may now consider—

THE SIGNS OF PANCREATIC INADEQUACY.

I.—*Defective external secretion* as indicated by—

A.—*Failure of tryptic digestion*.—Unaltered muscle fibres may be found in the fæces after a meat meal. More delicate methods are :—

(i.) On a milk diet the amount of phosphoric acid in the urine is greatly below the normal; after administration of pancreatic extract the amount of phosphoric acid is markedly increased.¹ The reason for this appears to be, that on a milk diet, caseinogen is the main source of phosphoric acid in the urine. In the stomach this is broken up into paranuclein and a proteid. Paranuclein, which contains 4 per cent. of phosphorus, is insoluble till it comes into contact with trypsin, which splits it up further into a proteose and paranucleic

acid, which is absorbed, and is the source of the phosphoric acid.

(ii.) Sahli's test. Gelatine capsules hardened in formalin are almost unaffected by gastric juice, but are dissolved by trypsin. If such capsules are filled with iodoform and swallowed, the saliva and urine should contain iodides and iodates, which may be tested for by chloroform and nitric acid; the nitric acid sets free the iodine, which gives a pink colour to the chloroform. Provided that the mobility of the stomach is normal, absence of this reaction, 4 to 8 hours after swallowing the capsule, shows that tryptic digestion is impaired. In such cases administration of 2 drachms of liquor pancreaticus two hours after the capsule will lead to appearance of the reaction an hour later.

B. *Failure of fat digestion* may result in true steatorrhœa or in the presence of fat droplets, fatty acid crystals, or soap in such amounts as can only be detected by the microscope. Normal stools should not contain more than 5 per cent. of fat. If excess of fat in the stools is due to pancreatic disease, it should be controlled by the administration of pancreatic extract. I believe that my uncle, Dr. Langdon-Down,²⁰ was the first in this country to treat fatty diarrhœa, due to pancreatic disease, by this method.

C.—*Failure of amylolytic digestion*.—Though ptyalin can digest boiled starch, amylopsin alone can digest unboiled starch grains. Abelman found 20 to 40 per cent. of the starch in the fæces after experimental excision of the pancreas.

II.—*Defective Carbohydrate Metabolism.*

Though glycosuria may be absent in pancreatic disease, it may often be excited by an excessive carbohydrate diet. Thus Wille tested a large number of patients with various diseases by administering 70 to 100 grammes of dextrose dissolved in half a litre of tea or coffee. The urine was passed just before, and was then tested at intervals of two hours. If alimentary glycosuria exists, sugar should be found at the end of two hours. It should be remembered that a normal individual can take about 200 grammes of dextrose before glycosuria occurs.

Wille found that, of 15 cases of alimentary glycosuria thus

tested, which he was able to follow to necropsy, so had grave lesions of the pancreas. Though alimentary glycosuria may occur in hysteria, exophthalmic goitre, and chronic alcoholism, it remains a sign of considerable diagnostic value.

Mayo Robson²¹ sums up the relative significance of these signs as follows :—

The presence of an excess of fat in the motions, in the absence of jaundice and diseases of the intestine, is suggestive of pancreatic diseases. If azotorrhœa is found along with steatorrhœa, it is almost certain that the pancreas is diseased, and if the pancreatic reaction in the urine (Cambridge), diabetes, and an epigastric tumour be present, the diagnosis is certain.

Of these signs, the only one which is of doubtful value is the pancreatic reaction in the urine.

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Prize Essay.

THE TREATMENT OF EPILEPSY.

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WITH the exception of those diseases, for which nothing can be done, the treatment of few is so difficult as that of epilepsy.

So little is known as to the cause of idiopathic epilepsy, and as to the functional action of the brain, that it is perhaps more surprising that the disease should be often arrested, and sometimes actually cured, than that it should so often resist our efforts to control it.

In treatment, the first question should always be, Can the attacks be ascribed to any cause which can be removed? It is seldom that this can be answered in the affirmative. Occasionally a course of peripheral irritation may be found, capable of exciting what are called "reflex convulsions."

Intestinal worms are the most frequent exciting agents, the round and tapeworms predominating: these should always be got rid of as rapidly as possible; but unfortunately, when the fits have recurred many times, they do not always cease on the expulsion of the parasite. Indigestible food is frequently regarded as the cause of the fit, but probably only acts in predisposed subjects. The irritation of a cicatrix may give rise to reflex epilepsy: a nerve may be nipped in the cicatrix, and so give rise to irritation convulsions. The remedy is excision of the scar, but unfortunately the irritation may recur, or the source of irritation being removed the fits do not always cease.

Dentition, adherent prepuce, or foreign bodies in the ear or nose may cause fits, especially in children.

Fright and masturbation are also put down as possible causes.

There is another class which comes under this heading, and

that is "toxic agents," *e.g.*, alcohol, lead-poisoning, syphilis, and uræmia : these should be met by appropriate treatment. Trauma to the head should not be forgotten, but gives rise generally to the epilepsy known as "Jacksonian," the fits beginning in one special movement, and gradually spreading to the rest of the body ; in these cases operation alone can give any permanent relief.

MEDICINAL TREATMENT.

Bromide.—The history of bromide as applied to epilepsy dates from 1857, when it was advocated by Sir Charles Locock in epilepsy occurring at the menstrual period. In 1861 Sir Samuel Wilks advised the use of the drug (combined with potassium iodide) in cases of ordinary epilepsy (*Med. Times*, Dec. 21st). Since that date the use of the drug has gradually grown, till in 1899 the amount used at the National Hospital for the Paralysed and Epileptic almost reached two tons.

The action of bromide on cases of epilepsy may be divided into three classes :—

I. A small one, resulting in permanent cure of the disease. This class is probably much larger than is apparent, for how many epileptics attend the out-patients' departments of hospitals for a few months with good results, and then are never seen again ? It may be fairly argued that a fair proportion of these are cured.

II. Another small class in which bromide is without any influence for good.

III. Between these two classes comes a third, containing the vast majority of cases in which the attacks are reduced in frequency, and often in severity, but are not arrested.

As to how bromide acts is not precisely known, but it certainly lessens the tendency to spontaneous "discharge." This "discharge" is due to the escape of atoms of the nerve-substance to combine with the oxygen of the plasma, and this chemical action bromide restrains.

This restraining action of the drug on the cerebral cortex can be proved experimentally : the brain of a dog is exposed, and the motor cortex stimulated with a known strength of electrical current, and a certain contraction is obtained ; if

bromide is administered, and the same stimulus again applied, a much lessened contraction is obtained, or it may be entirely absent.

The bromides commonly employed are those of potassium, sodium, ammonium, lithium, and strontium; the amount of bromine in each differs considerably :—

Lithium bromide	-	-	-	92	per cent. bromine.
Ammonium bromide	-	-	-	81½	„ „
Sodium (anhydrous) bromide	-	-	-	77½	„ „
Potassium bromide	-	-	-	67	„ „
Strontium (crystallised) bromide	-	-	-	47½	„ „

Since the amount of bromine administered is of first importance, lithium bromide should be the most effective drug, but it is not so; sometimes one, sometimes another salt, seems to answer better in a given patient.

Combinations of the various drugs are much employed, but there is little or no evidence to prove that they are more effective than a single drug.

Case for case the potassium salt appears more useful than that of sodium.

ADMINISTRATION.

The endeavour must be to find a dose of the drug employed which arrests all attacks, slight and severe, and which the patient can stand; this must be continued until it is supposed that stability is established, and then discontinued by gradual diminution.

A large proportion of the relapses reported is due to the fact that the patient takes the drug for a few months with complete arrest of the attacks, and then allows the treatment to drop, a relapse frequently speedily occurring.

The best results are obtained by from 60 to 80 grains of the salt, *e.g.*, potassium bromide, a day in two or three doses; often two 25-grain doses a day are sufficient. If 30 grains three times a day do not produce arrest, larger doses are seldom successful.

Bromide is best given after meals, to prevent its too rapid absorption, and to enable small doses of arsenic to be administered to prevent acne. If the attacks occur during the night, a single dose of 30 to 40 grains at bedtime is frequently all that is required; attacks coming on shortly after rising in the

morning should be met with an early morning dose without arsenic, or with arsenic and a cup of tea. Children stand a larger dose than adults in proportion ; it is useless to give a child of one year anything under 5 grains.

The drug should be continued for about two years after the arrest of the attacks, and then should be gradually discontinued during the third year. It should never be suddenly left off. Most cases of the "status epilepticus" are due to sudden discontinuance.

Other Salts of Bromine.—Bromide of strontium is thought to produce less acne, but seems to have no superiority over the more common salts in arresting the attacks, and in large doses is not at all well borne by patients.

Bromides of nickel and camphor have been tried, but can only be administered in small and so useless doses.

Bromalin (bromethylformin) was supposed to be decomposed in the stomach into bromine and formaldehyde. It is very expensive, has but little influence on attacks, and readily causes acne.

Bromipin, a combination of bromine and sesame oil, containing 10 or 33 per cent. of bromine. Given by the mouth, is only absorbed when the oil is acted on by the pancreatic secretion, bile, &c. It can also be administered by inunction. The preparation has less tendency to cause acne, but also less tendency to arrest attacks.

Hydrobromic acid cannot be given in sufficient quantity to be of any service.

DISADVANTAGES OF BROMIDE.

I.—Mental and physical depression : this is due to a greater dose than the patient can well tolerate, and so should be regulated accordingly. It is rare for any definite derangement of mental functions to take place. Lessened sensibility of the pharynx is an early symptom of bromism.

II.—Bromide rash : due to a cutaneous idiosyncrasy. Generally consists of a large inflamed base with a small central pustule. In these pustules the presence of bromine can be readily demonstrated,

3-5 minims of the liquor arsenicalis given with the bromide, after meals, will cause subsidence of the rash.

Various other drugs have been combined with bromides, the most useful being digitalis, especially in cases complicated by cardiac disease, an explanation of this is not forthcoming. Strophanthus and belladonna are also sometimes beneficial. Stramonium, cannabis indica, gelsemium, and hyoscine have also been advocated.

Opium has been tried, but without good results. Flechsig, in 1893, gave the drug for two months up to 15 grains daily, preparatory to giving bromide, but others, who have tried the method, do not report favourably.

Borax, in inveterate cases of epilepsy in which bromide has no effect, sometimes gives great relief; the drug may be pushed from 15 grains to 30 grains three times a day.

Nitro-glycerine has not given good results, but sometimes in cases of minor attacks, especially in children, $\frac{1}{100}$ grain three times a day is of benefit.

Zinc, in the form of the oxide, may be used with beneficial effect; it is best given in the form of a pill, 3 to 7 grains, along with a dose of bromide.

Status Epilepticus.—When this condition follows the omission of bromide, it is important to give full doses of the drug, 30 grains by the mouth, or 60 by the rectum, every four hours; this treatment combined with chloral hydrate, 20–30 grains by the mouth, or 40–60 by the rectum, is frequently successful.

Inhalation of chloroform will cause temporary arrest of the attack, and is useful to gain time for other drugs to exert their influence.

Hypodermic injection of hyoscine hydrobromate, $\frac{1}{100}$ grain, repeated in four to six hours, is very valuable.

Morphia in full doses, $\frac{1}{4}$ grain, has been used with success.

TREATMENT OF ATTACKS.

If the auræ are definite, the attack may be arrested, *e.g.*, convulsions beginning in a limb may be arrested by tying a ligature round higher up, or a blister may be applied, or a strong gustatory or olfactory stimulus, *e.g.*, chewing a piece of ginger, or application of ammonia to the nostrils, may cause arrest.

Amyl nitrite, by inhalation, is the most dependable drug to arrest the convulsion, if flushing of the face can be induced before the loss of consciousness.

TREATMENT DURING ATTACK.

The patient should be laid down, clothes loosened round the neck, and some soft substance placed between the teeth to prevent the tongue being bitten. If vomiting occurs, the patient must be turned on to the side to prevent substances falling into the larynx.

GENERAL REGIMEN AND MANAGEMENT.

Diet.—All indigestible foods should be avoided, meat should not be taken more than twice daily, and beef sparingly. Stimulants should not be taken. A heavy meal ought not to be taken previous to retiring to bed.

Education.—Epileptic children should be educated, but they must not be pushed; an occupation should also be taught, but it should be a safe one, lest an attack occurs whilst carrying it out.

MARRIAGE.

As far as the individual is concerned, marriage does not seem to have much influence on epilepsy; during pregnancy the fits frequently cease temporarily. If either parent is suffering from idiopathic epilepsy, and especially if there is any history of hereditary taint, as insanity, fits, suicide, &c., there is definite danger of transmission to offspring, and the physician should distinctly deprecate the union. In cases in which no inheritance can be traced, it is difficult to give an opinion, but marriage should not be encouraged.

SURGICAL TREATMENT by trephining. The operation cannot be regarded as justifiable in any case of idiopathic epilepsy, but in those cases, due to head injury or organic disease, the operation may hold out the only hope of relief. Cases of convulsions of local onset following a blow give better results than those in which the causal lesion is the result of disease. The longer the case has existed the less likelihood is there of a cure, as the brain seems to acquire a state indisposing to the cessation of the attacks.

FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

THE ROYAL INFIRMARY OF EDINBURGH: AN HISTORICAL SKETCH.

[With Plates X.—XI.]

THE historic hospitals of London owe to the Church their foundation at an age, when she alone was almsgiver to the sick and needy, as well as the guardian of learning. The Infirmary of Edinburgh, no less famed, arose quite otherwise, as the following pages will show.

In the early years of the eighteenth century Scotland had no general hospitals. Houses of detention for lepers and sufferers from other contagious disorders, it is true, existed, but these were designed rather for isolation than cure; traces of one survive in the name of a suburb of Edinburgh—Liberton, or Lepertown; while patients with grangore (syphilis) were formerly exiled to Inchkeith, an island in the Firth of Forth. In Edinburgh, the town paid a surgeon-apothecary to attend impoverished citizens, but this was all; those who were not burgesses had none to whom they could apply, and for no sick person was there any sick-room save his own dwelling. To the Royal College of Physicians is due the honour of the first collective attempt to better this state of matters. Incorporated in 1681, at their second sederunt they resolved to appoint physicians to the poor from among their number, and at their third meeting Drs. Burnet and Crawford were elected to "serve the Poore of the Citie and Suburbs."¹ The dispensary so established proved the germ of the Infirmary, and its supervision was one of the chief duties undertaken by the new corporation during the first half-century of their existence.

The inception of the Infirmary was due to the College of Physicians, to Lord Provost Drummond, and to the Monros,

¹ Peel Ritchie: *The Early Days of the Royall College of Physitians*, Edinburgh, 1899, p. 80.

and though it is now difficult to apportion the debt we owe to each, the attempt is not without interest, and is justified by the variance of contemporary accounts.

Chronologically, the idea of an hospital was first mooted in 1721, in an anonymous tract (no longer extant), but there seemed so little prospect of success that the scheme fell still-born.¹ The author of this tract was one of the Monros, probably the father. According to Bower,² it was written by "Dr. Monro," and a writer of the time ascribes it to "Mr. John Munro, Chirurgeon."³ John Monro, the father of Monro primus, having settled in Edinburgh in 1700, was keenly interested in the establishment of a medical school there—"the idea of his life," Struthers says—⁴ and about 1720 he laid before his professional brethren a scheme for having medicine and surgery properly taught. Nothing is more likely than that he would advocate, as part of his plan of medical education, the erection of an infirmary. Why this first attempt was fruitless, history does not relate, but in 1725 the scheme was again, this time successfully, afoot, and henceforth there is no doubt that the College of Physicians took a prominent part in it.

A Fishery Company being about to liquidate, the physicians seized the occasion, and obtained an assignation of some of their stock for the foundation of an Infirmary. Drummond (the intimate friend and life-long supporter of Alexander Monro) was chairman of the company, and threw himself heart and soul into the good work, as not only the inscription below his bust in the Infirmary,⁵ but the story of the building of the institution show. At first, however, as is, for instance, shown by the fact that the treasurer was made responsible to the College for monies received, the project was in the hands of

¹ *Account of the Rise of the Infirmary*, Edinburgh, 1730.

² Bower: *History of the University of Edinburgh*, Edinburgh, 1817, II., p. 186. Bower gives the whole credit to Alexander Monro and Drummond, but he writes, says Sir Alexander Grant, with the fear of the Town Council before him, hence his statements must be discounted by so much. Throughout the text he invariably refers to "Mr. Alexander Monro," and it may be conjectured that the footnote giving the authorship of the pamphlet to "Dr. Monro" refers to John, the father of Alexander.

³ *Letter from a Gentleman in the Town to his Friend in the Country, &c.*, Edinburgh, 1739.

⁴ *Historical Sketch of the Edinburgh Anatomical School*, Edinburgh, 1867, p. 19.

⁵ "George Drummond, to whom this country is indebted for all the benefits it derives from the Royal Infirmary."

the physicians, who themselves subscribed and collected money from non-shareholders. The Incorporation of Surgeons took no part collectively, but individual members gave donations. At the same time the College of Physicians pledged themselves "without any prospect of Reward, Fee, or Sallary to attend the hospital faithfully." In February 1728, the funds having reached the modest £2,000 aimed at, the second phase of the undertaking was entered upon by the College giving an account of its stewardship to a meeting of contributors, and transferring a part of the burden of management to a committee of their number. This proceeding—the appointment of a committee of contributors to erect and maintain the Infirmary—has borne fruit in our own day, and explains historically the power of the present court of contributors to overrule the decisions of the managers. The Assembly of the Church of Scotland was petitioned for voluntary subscriptions from the various parishes throughout the country by the College of Physicians, the hospital having as yet no settled government, the promoters thus claiming for the Infirmary a character which it has never ceased to assert—that of being a national, not a local institution.¹ The result of the petition is thus described by Maitland the historian: " . . . such was the amazing indolence, laziness, and obduration of the . . . incumbents, to their eternal reproach, few of them concerned themselves in this truly great and Christian work " which was "deserted by about ten out of eleven of those who call themselves Ministers of God."² The episcopal clergy, however, contributed generously, and at a later period the Church of Scotland did more than wipe out the stain of her early niggardliness. Another association which lent a helping hand was the Ladies of the Assembly, a coterie under whose auspices subscription dances afforded a meeting-place for society men and maidens in the 18th century. By dint of efforts such as these the committee were in a position by December 1728 to proceed with building, and meanwhile to open a temporary hospital. A "little low-rented house" was leased from the University, furnished, and staffed with a house-keeper and servant; it was opened—the

¹ *Account of the Rise of the Infirmary; History and Statutes of the Royal Infirmary, Edinburgh, 1749.*

² *History of Edinburgh, Edinburgh, 1753, p. 451.*

first Edinburgh Infirmary—on August 6, 1729, and during the year 35 patients from all parts of the country (the first on the register hailed from distant Caithness) were treated within its walls. The site of this house is now unknown; it was, however, close to the University, for the professors allowed its inmates the use of the adjacent garden. By a minute of the College of Physicians of August 5, 1729, it was unanimously agreed to "attend the Infirmary in yr turns for the space of a fortnight until some settled method be agreed upon," accordingly the President appointed Dr. Drummond "for the first fortnight which commences to-morrow."¹ It now remained to provide surgeons and medicines, and six surgeon-apothecaries (the Incorporation then numbering between 30 and 40 members)—McGill, Congalton, Hope, Cunningham, Douglas, and Alexander Monro—agreed to supply medicines and to attend without fee.²

The Infirmary had now definitely begun its career, but subscriptions were coming in slowly, and not until a charter was obtained in 1736 did the general public unloosen their purse strings and make the charity their care; two years later it was possible to lay the foundation stone of the old Royal Infirmary.³

Among the most indefatigable in working to ensure success were Drummond and Alexander Monro, who were appointed the building committee. The funds obtainable in Scotland being insufficient to complete the plan, circulars were dispersed

¹ Peel Ritchie, p. 89.

² *Vide* note, p. 256.

³ A greater share of credit for the erection of the Infirmary than the writer is disposed to concede is given by some to the College of Physicians. "A Sermon by Ninian Niven, Edinburgh, 1739," is dedicated to them as "its first authors," and the preacher introduces his homily by saying that they set the scheme on foot. The earliest official history (*Account of the Rise and Establishment of the Royal Infirmary*, Edinburgh, 1730) is silent as to the connection of Drummond and Monro with the beginning of the undertaking, and in a retrospect (*Memorial for the Managers, Bill Chamber*, January 28, 1801) the subscription is said to have been conducted under the influence of the R.C.P. Grant's statement (*The Story of the University of Edinburgh*, London, 1884, II., 305) is that when Drummond became Provost he started the subscription list, and that the College then took the matter up. On the whole, the writer would apportion the honours thus:—One of the Monros, probably John, first promulgated the idea; through the action of the College of Physicians in collecting funds the dream became capable of realisation; on Drummond and Monro devolved the actual labour of carrying it out in detail.

throughout England, Ireland, and the Colonies, and in return for the generous response accorded to these, the managers enacted a law, expressed in the present motto of the Infirmary—*Patet Omnibus*—that all sick persons, of whatsoever nationality, should be equally eligible for the benefits of the institution.

The actual building of the Infirmary evidently evoked the greatest enthusiasm among those employed. "Providence does . . . manifest itself in this Affair . . . (as) appears by the Eagerness of the People of all Denominations, who, as it were acted by a Divine Impulse, vied to promote this good, laudable, and useful Undertaking; many contributing Money, others gave Stones, Lime, Wood, Slates, and Glass, which were carried by the Neighbouring Farmers *gratis*, and not only many Master-Masons, Wrights (Carpenters), Slaters, Glaziers, &c. gave their Attendance but many Journeymen and Labourers frequently gave their Labour *gratis*; and many Joiners gave Sashes for the Windows."¹ The managers paid the journeymen direct, and so saved the masters' profit: occasionally funds were short when the weekly wage-bill fell due, yet we are told that the workmen did not repine, and the managers, actuated by the same self-denying spirit, were so scrupulous to apply all funds to the building and furnishing, that they themselves paid incidental charges. Eventually the Infirmary was opened for the reception of patients in 1741.

The building, which stood on the south side of Infirmary Street, was demolished in 1880, and therefore the following details of its structure are worth recording. The central portion was the administrative block, the wards being situated in the wings. In the former were placed the consulting-room, and a large theatre, capable of accommodating 200 students; the latter also served as a chapel, and over it a cupola was raised, which, it was suggested, might be used as an astronomical observatory. In the basement were 12 cells for mad people, but this number proving excessive, some were diverted to other uses, while, in a vaulted cellar, the "great mortar" and other appliances for use in the coarser operations of pharmacy were placed.

One-half of the hospital was reserved for men, the other

¹ Maitland, p. 460.

for women ; 228 patients could be accommodated " each in a separate bed." There were medical and surgical wards, a ward for lying-in women under the direction of the clinical Professor of Midwifery, and in a remote part of the attics, a salivating ward for female patients. The beds were arranged in pairs, within curtained-off cubicles ; those at the corners (fire-fooms, they were called), had the ward fire-places in them, and were reserved for cases which a high temperature was thought likely to benefit. In the west wing there were baths given over to the use of the town's people, and in the east wing the patients' baths were situated.

The subsequent history of the old Infirmary, though chequered by incidents which doubtless created much stir at the time, was on the whole uneventful. Disputes there were between the managers and staff, and more than one individual member was suspended, but it would serve no useful purpose to exhume the ashes of dissensions long since dead. Before the first hospital was opened, and while its regulations were being drawn up, Alexander Monro offered to provide medicines at prime cost and to attend daily for a year. Shortly after this the College of Surgeons offered their services, but the managers declined to discuss with them collectively a bargain which could not bind their successors, and demanded a specific obligation from such Fellows as would serve. On these terms only the six members of the Incorporation already mentioned consented to act, and agreed to supply medicines gratis and attend in rotation without fee.¹ Six years later their number was added to by the appointment of George Balderston as lithotomist, he "having particularly studied the art of cutting for stone." In 1738 the Surgeons' Hospital amalgamated with the Infirmary, and the members of its staff acted as surgeons to the older institution. As time went on, however, the system of rotation was not found satisfactory, and in 1751 two ordinary physicians were appointed, and in 1766 four ordinary surgeons, in addition to the rotation of all the Fellows of the College who wished to serve. The method of securing a Staff for the Infirmary was, however, subject to repeated alterations,

¹ This account of the appointment of the surgical staff, which is taken from the managers' pleadings before the Court (Bill Chamber, January 28, 1801), differs in some respects from that in the *History of the Infirmary*. Cf. *supra*, p. 254.

PLATE X.



The old Royal Infirmary, Edinburgh.



The present Royal Infirmary.

PLATE XI.



The Gynæcological Theatre.



The Gynæcological Ward.

and the plan of electing medical officers for definite periods according to the present system grew up only by degrees. It would be tiresome to follow out all the makeshifts which were adopted from time to time, and which were the subject of recurrent disagreement between the College of Surgeons and the managers, the former asserting their privilege of acting on the staff, the latter their right to regulate the terms of service as they thought best. Out of the peculiar and intimate relationship of the two Colleges to the Infirmary, from its very earliest days, arises the fact that only Fellows of one or other Corporation are to-day eligible for election to the staff of the Infirmary.

In the '45 the wounded from the battle of Prestonpans were treated in the Infirmary, and soon afterwards, in return for a government grant of £8,700, sixty beds were set aside for sick soldiers, each of whom paid 6d. per diem for lodging. As time went on, the Infirmary became too small for the needs of the population, and it was extended in 1828 by the purchase of adjacent buildings in Surgeons' Square—the Royal High School and the College of Surgeons—which were adapted to form a new surgical hospital, the old building being retained as the medical house.

This, the enlarged Old Royal Infirmary, was the scene of the work by which Syme, Simpson, Spence, and Lister made the surgical school of Edinburgh world renowned; here too it was that Christison, Laycock, and Begbie taught, and Bennet introduced the methods of bedside instruction which still make the Infirmary supreme as a school of the physician's art; here too it was that W. E. Henley lay a patient for twenty weary months—months of suffering that were not fruitless, for they gave us in undying verse a glimpse of the patient's view of the commonplaces of hospital life, of his anticipations, his pleasures, his fears. Bearing all this in mind, is it any wonder that the "Old Royal," now but a memory, has, for the generation which knew it, a glamour of romance which its successor can never hope to possess?

In time even the extended Infirmary became inadequate, and it was proposed to purchase neighbouring property and rebuild the whole medical house. Thanks to the wisdom of Syme, however, a new and more open site was found near the

meadows, and on it was erected the present Royal Infirmary, which, though opened in 1879, and notwithstanding the constant improvements which have taken place in hospital construction during the past quarter of a century, is still, partly from the inherent soundness of its original design, and partly through the unremitting assiduity of the managers in remedying what was faulty, and adding as need arose, one of the finest general hospitals in the world.

The present Royal Infirmary, the foundation stone of which was laid by His Majesty, then Prince of Wales, in October 1870, is built on the site of George Watson's School, which, with $11\frac{1}{2}$ acres of surrounding land, was acquired from the Merchant Company and others. The site was admirably chosen for a hospital. Sloping as it does gently to the south, where it faces the meadows, it has to the north another large open space, while immediately to the east stand the new University buildings in which the medical classes are conducted. The infirmary is constructed on the pavilion system, there being two main corridors running east and west, each with pavilions in which the principal wards are placed. The northern series of six pavilions constitute the surgical, and the southern, of four, the medical house, while between the two lie the administrative buildings, for part of which the old school was utilised. The plans for the hospital were prepared by the late David Bryce, R.S.A., and were carried out by his nephew Mr. John Bryce. The architectural style adopted was the Scotch Baronial, of which circular turrets are a prominent characteristic, and these, while decorative in appearance, are equally adapted to the requirements of hospital economy, for in them the lavatories, &c., are placed in such a way as to be disconnected from the wards which they serve. Each pavilion is three-storied, with a basement and attics, and contains three wards, with side rooms and offices, while in the attics are nurses' and servant's bedroom. Behind the main entrance in the north front is a large operating theatre holding 500 students, while two smaller theatres seated for 300 open off the main surgical corridor. On the medical side there are two clinical lecture theatres about the same size as the latter. West of the main building is situated the pathological department and mortuary. The wards in the surgical department accommodate

16 beds, with one or two additional in the siderooms, and in this division of the hospital the ophthalmic, delirium tremens, and male lock wards are placed. On the medical side the wards, twelve in number, are larger, each containing 24 beds with additional sideroom accommodation. In the central tower there are two female lock wards. Such, without going into details, is the general plan of the present Infirmary as it was at the time of its opening, and as it remained for some years thereafter. It was designed for about 600 beds, or 140 above the daily average of patients treated in the last year of the old Royal. Since the earlier nineties, however, scarcely a year has passed without additions, and it is rash to predict where the end may be, although it would at present seem as though a halt must be called for want of ground space. Three theatres being found insufficient in days when operations were increasing tenfold, two new ones were added, and subsequently two more, so that now each surgeon has a theatre of his own, fully equipped according to the most modern ideas, while the large theatre, fallen into desuetude, is used solely for demonstrations and entertainments. With the growth of the ear and throat and skin departments two small wards were found necessary, and a new nurses' home was opened in 1892 in the space between the medical and surgical houses. Gynæcological patients were originally treated in the medical wards, but with the growth of the speciality this was found to be inconvenient, and on the occasion of the Diamond Jubilee money was raised to erect a commemorative pavilion, which was opened about five years ago. In this extension, a medical ward, and two gynæcological wards, each with a theatre, are situated, while the basement is given up to a complete installation of baths for therapeutic purposes. After this was finished a pavilion devoted to ophthalmological and laryngological wards was built, and these departments are now totally isolated from the rest of the Infirmary, although within its grounds. The great increase in the size of the institution (which at the present day has accommodation for 900 patients in all) involved by these extensions naturally demanded a corresponding enlargement of the administrative offices, which was carried out from time to time, and at the present moment a new surgical out-patient department is being constructed, as

the old system of dealing with this important class of cases had become antiquated. At the time when the present Infirmary was built the managers entered into a bargain with the town council to maintain and administer the old surgical house as a fever hospital, and this arrangement was carried on until 1885, when the municipality undertook the charge of infectious cases and acquired the buildings, which continued to be used as a fever hospital until last year, when they were sold to the University and are now being converted into physical laboratories.

The Infirmary as a Clinical Hospital.—It is no doubt because the Infirmary owed its origin to Monro, the College of Physicians, and the public-spirited Drummond, that from the very first the opportunities it would afford for clinical teaching were ranked second only to its charitable aims. At the time it was built there were seldom less than 200 apprentices and students of surgery in Edinburgh, a by no means inadequate nucleus of the medical school which, we are told, “the managers spared no pains in cherishing.” Among other schemes to attract students they resolved to collect a library, but the fact that the Royal Medical Society had already a considerable collection of books rendered this superfluous.¹ In contemporary arguments for the foundation of the Infirmary we constantly read of the benefits which would accrue to the community through the numbers of Scotsmen who would be induced to remain at home to study instead of going abroad to Leyden and elsewhere. Student apprentices evidently “walked the hospital” in a very literal sense in the early days, and seem to have had access to the wards at all hours of the day and night. This naturally led to abuses, and in 1785 an attempt of the managers to restrict the hours of attendance aroused the students to great indignation, and caused them to demand admission from 9 a.m. to 8 p.m. at least.² No doubt one reason why a good deal of consideration was shown to students in those days was the relatively large fraction of the Infirmary’s income which was derived from their fees. In the earliest laws of the Infirmary one of the duties enjoined on

¹ *Hist. Royal Infirmary*, 1778.

² *Narrative of Proceedings of Managers against Students of Medicine*, Edinburgh, 1785.

the Clerk of the House (apparently a sort of resident medical superintendent) was that of transcribing cases for the students, at a charge of 2d. a page, "written on middle-sized paper, with middle-sized lines and letters." From an early period, too, arose the custom of setting aside for clinical teaching a ward into which the more interesting cases were collected, and with the growth of the medical faculty of the University, the Infirmary managers gradually came to place at the disposal of certain of the Professors, medical and surgical wards, which by use and wont were held by the Professor during his tenure of the Chair, irrespectively of the duration of office on the staff of the ordinary physicians.

We may conclude this sketch by a paragraph on the present working of the Infirmary for comparison with that in vogue in English Hospitals. The institution is governed by a Superintendent, a medical man, whose functions, however, are purely administrative. He is responsible to the managers, who form a statutory board, and include representatives of the chief public bodies in Edinburgh. The Staff have no direct voice in the management, but several medical men, some of whom are usually retired members of the staff, sit on the board as representatives of the Colleges and University—a system which serves to keep the managers fully in touch with the views of the physicians and surgeons to the institution. The honorary staff consists of ordinary and assistant physicians, surgeons, and specialists appointed for definite terms, and certain University Professors, who have charge of wards during the pleasure of the managers.¹ Hospital work begins at 10 or 11 a.m. and goes on until 2 o'clock, while the wards are again open to the students in the evenings. There is a University and an Extra-mural class of clinical medicine, the former connected with the University wards, the latter with those of the ordinary physicians. Two clinical lectures are given weekly by the teachers in rotation, but the serious study of medicine is done in the wards of the individual physicians, under one of whom each student works at case-taking, clinical methods, &c. On the days not allotted for lecture bedside clinics are held in the ward, at which the students read and hear commented upon

¹ By a recent rule, however, an age limit of 65 is imposed on *all* future members of the staff, including the holders of University chairs.

the cases they have taken. They are expected to attend the wards regularly every evening, and altogether a "final" man ought to do from two to three hours of actual practical bedside work daily, in addition to attending clinics on the various specialities. The arrangements on the surgical side are similar, but here there is less evening work, and each surgeon lectures separately and has his own following. Clinical tutors, who hold evening classes, are appointed to each ward, while the house physicians and surgeons now do less teaching than was formerly the case, and are able to give all their time to ward work. On the whole, the extern department of the hospital is less developed than in the south. There are large surgical, ophthalmic, ear, throat, and skin out-patient clinics, but no maternity cases are taken, and the medical out-patient department is relatively small considering the size of the Infirmary. This is due to the existence of public Dispensaries independent of the Infirmary, in which clinical instruction is given, and also to the fact that medicines are not supplied to Infirmary out-patients. There is no special clinic for disease of children, which are treated in a separate hospital. Recently a movement was on foot for the hospital treatment of "borderland" mental cases in the Infirmary, but there is little immediate prospect of its being brought to a successful conclusion.

About eleven years ago the managers decided to admit women students to the practice of the Infirmary, and medical and surgical wards were set apart for them; they also have access to the various special clinics.



BY-PATHS OF MEDICINE.

PHYSICIANS OF THE RESTORATION.

II.

GIDEON HARVEY loses no chance of pouring the vials of his scorn on "anatomical Physitians" whom he calls "dog-fleyers" and "calfs-head dissectors." Anatomy itself does not escape his contempt. He says: "The necessary point of Anatomy consists chiefly in the temperament, Figure, Situation, connexion, action and use of the parts; and not in superfluous, incertain, and probably false and indemonstrable niceties practiced by those that flea Dogs and Cats, dry, roast, bake, parboil, steep in Vinegar, Lime-Water, or *aqua fortis*, Livers, Lungs, Kidneys, Calves Brains or any other entrail, and afterwards gaze on little particles of them through a microscope, and whatever false appearances are glanced into their eyes, these to obtrude to the World in Print, to no other end than to beget a belief in people that they who have so profoundly dived into the bottomless pores of the parts, must undeniably be skilled in curing their distempers."

In this, as has been seen, our author agrees with Sydenham. Like him, too, Sydenham had for some reason been excluded from the College of Physicians. These bonds of fellowship did not prevent Harvey from denouncing his great contemporary in the most truculent fashion. He speaks of him as "*a Western Bumkin that pretends to Limbo Children in the Small-pox by a new method.*" Elsewhere he gibes at him as "*the Doctor of Contraries who with Opium and Jesuits-Powder shall make more various sorts of passes at Diseases than ever any Roman Gladiator with his Weapon; and these shall be hits and do execution.*"

"As, for instance, if the Doctor is applied unto for his assistance against a continual Feaver, according to his last good or ill success in the like case, gives his direction for bleeding or omits it; then with an unparalleled assurance

makes at the Distemper with an ample Dose of the *Jesuits-Powder*, pursuing this fierce onset with a fresh supply of the same Bark every fourth hour : And finding the fiery adversary provoked, produces his other Champion (*Opium*) to encounter him, so between these two Bravo's frail Nature doth too oft lie down and yield and the Patient is brought to his *ultimum vale*."

Sydenham's treatment of small-pox comes in for special censure : "The *Small Pox* (a Distemper so unaccountable to most Physicians, and therefore Empirically treated whence Nurses do equally vie with their Worships in the Cure) is by this *Generalissimo* (contrary to all sence and experience, countermined with Spirit of Vitriol and Opium by which beyond all others he is infallible in procuring an Euthanasia. Good God, how the Universities do rob the Plough ! But *apropos* let me make an offer to this grand Minister of Medicine, if his humour holds of making purchases upon the lives of his Patients, I will *bona fide* for one years purchase, sell him Annuities upon the lives of all (or none ; for some Natures are so robust, that nothing can subdue and therefore some few may escape) he shall treat with the Bark and *Opium* in continual *Feavers* and with *Spirit of Vitriol* and *Laudanum liquidum* in the *Small Pox*."

Against Thomas Willis, Gideon Harvey was still more venomous. In the Introduction "San Villisio" is said to be one of the Saints acknowledged by the Conclave, and in the body of the work there is a Chapter which bears the promising title "Willis his Hypothesis of Agues is ridiculously Erroneous." The promise is amply redeemed. We are told that Willis for "couching Physical Romances and Romantick notions, smoothly, elegantly and Physicians of Par. only resembling Truth, doth exceed *Monsieur Scudery* in his Historical Fictions, could it but be believed the style and the Latine were as much his own as the matter. Had the said Willis from observation abstracted his Novels, a happier success would have attended his practice, than which nothing ever proved more pernicious and fatal to most of those Patients that subjected themselves to his, and the followers of him, Their debauch'd advice which the Bills of Mortality of his time and since did amply testify. His *Caprices* being ever

formed before experimental observation, he was obliged to strain the latter, to render them agreeable to the former which was the cause of that great number of Caytifs failing under his management."

After a criticism of Willis's theories and the treatment founded thereon, in the style of Diafoirus, he concludes :

"A fine sort of Empirical and destructive practice whereunto the man being glued by such like false Opiniater notions, was driven to a most unreasonable use of Spirit of Hartshorn, posting thereby Legions of Patients to untimely ends, and still continued by his unhappy successors who, in imitation of their master, aim at nothing more than getting of fees by defrauding people of their lives."

He bluntly charges Willis with "cooking" his cases :

"That this Iatrosophist has given himself over to Physick Tales, and invention of Cases that never happened, producing them in Evidence to maintain his false positions, this instance of a Cure performed at Oxford on a Young Gentlewoman, now the Wife of an Attorney of the Lord Mayor's Court, may convince you ; whence and from the course he directed her Mother, both decumbent of an intermittent Feavor he abstracted his Theorems of Agues. To the former he had exhibited such a proportion of *Mercurius Dulcis* as raised a Salivation so plentiful that it had almost Embark'd her in *Charons Boat*, and put himself into the humour of attending her to the end of her voyage, to anticipate the reproach and scandal which then was likely would inevitably ensue, though through mercy she narrowly escaped his hands scarce Cur'd, as likewise did her Mother, which afterwards he draws into consequence, as I hinted before, for installing his erroneous Principles of Agues." "This being related to me," adds our austere censor *morum et medicorum*, "did ever after excite an aversion to the Author and a diffidence in his writings."

From what Gideon says a page or two further on, however, it would appear that his dislike and "diffidence" had been excited a good deal earlier. Speaking of the treatment of intermittent *Tertians*, he says : "On the other hand I have seen Bleedings and such Purgatives or Laxatives which he so highly commends, only to make his marks to bear, a hundred times continued in use and repeated in eight, ten or twelve interval

days, and exhibited before the Fit, with no more success than commonly attended his first practice at *Oxford*, which I particularly took notice of (being myself then a Student in *Exeter* Colledge) was so inconsiderable that he was forced to block his Pen and so by forging of Novelties, thereby removing the bushel from over his Candle, allured a number of poor Country Patients though at that time very raw in all manner of experience, nor advanced in the least in practical observations ; so that at last *Justice* for his having so long impunitely injured mankind, made him his own Executioner, dying under the same misapplications so many hundreds had miscarried by. Though after he had thus practised many years, I have met him in consultation, then whom I never observed a man less Sagacious in finding out a Disease, and therefore he would ever submit to any that should discover it, being wholly unfurnished with the Diagnostick part, whereby he might oppose or approve another's judgment."

Harvey's hatred of Willis, whatever may have been its origin, was evidently deep-seated, for at the date of this attack the illustrious pioneer of cerebral anatomy and discoverer of saccharine diabetes had been eight years in his grave. In what is said about his lack of sagacity in finding out a disease, however, there would seem to be the touch of truth which gives point to satire, for there is on record an example which shows that Willis made a mistake in diagnosis of which a third year's student at the present day might well feel ashamed. He took an aneurysm as large as a man's fist protruding through the upper part of the sternum to be a "Wenn" and prescribed the application of a plaster ! Charles the Second is said to have suggested to Harvey that he had dealt too harshly with Willis, but what effect the royal remonstrance had we do not know.

There are references to other physicians of the day under such names as Le Sieur de Tattle and the Sieur Phlegmatique, and to one or two surgeons, all of whom doubtless could readily be identified by contemporaries, but to us they are hid in death's dateless night.

Harvey boasts that his education was beyond that of any "Conclave Physician," but on his own showing this was not saying much. After describing the training in vogue he says :—

"And now after all this *apparatus*, we will suppose our Infant-Physician so compleatly dress'd up with these fore-noted School and Academick Ornaments, and his mind so gaudily painted and daub'd with the ancient, uncertain, and some new tickling notions in Medicine, that you may hear the clapper of his Tongue eccho from the East to the West Gate of your Town ; Yet, introduce him to a Patient and grant that he, by appuising or resting his Velvet-Body on his *Japan*-Crutch, and fixing his Intellect, by drawing the broad-brimm'd Beaver over his eyes, seemeth to mimick a decrepid Gravity and by that to weigh himself down to the bottom of your Belly, to rummage for the Disease ; when he wakes (for he has only been in's dumps) out of this brown study he shall no more know the Distemper or the cause of it (though he hath read it in Authors twenty times) than the Skipper that never was toss'd on the Ocean before pretends to find out *Bermudas* by his *Waggenaer* ; Nevertheless doth he adventure to call for Paper and Ink, to figure down a Remedy he never saw before, being only acquainted with the bare Name of it. This you are to swallow and to render your Body the subject whereout he is to dig his experience at the cost of your Health, Life and Estate. When by his Book-applications he shall thus have brought your crazy Tenement (and probably of Hundreds more) to the ground, the World that consists chiefly of the Vulgar will then form the calculation of his numerous experience (though ever so unfortunate) entitle him *a most skilful Doctor*, and in flocks voluntarily surrender their bodies to his torture."

There are touches in this picture that would not be out of place in an account of the profession of to-day.

Of the arts by which physicians tout for patients we naturally hear much. What Harvey calls the "industrious craft most in use" was "the sending forth of Emissaries that are in acquaintance with any of Note whose misfortune it is to lie under a main course prescribed by others." These emissaries made it their business to inform those whom it might concern that the doctor for whom they acted had "in a very short interval cur'd such and such of the same Distemper." The patient forthwith calls in the physician, of whose skill he hears such wonders, and the new counsellor takes care to give him "several slie Items . . . of mistakes committed

by his former Physick-man." This of course is never done in our virtuous days. Among other tricks of the trade mentioned by Harvey is that generally associated nowadays with the name of that respectable Bristol practitioner, Mr. Thomas Sawyer late Nock-em-Orf, though it is fully described by Smollett in *Ferdinand, Count Fathom* :

"Hypocrisie is an instrument he manages with incomparable dexterity. The Church door shall no sooner be opened but *Ecce* Mr. Doctor sitting in the most visible Seat, grave, Deaf, Dumb and immovable as if an *Apoplexy* of Devotion had seized him, out of which his *Apothecary* is to raise him, by knocking at half Sermon at his Pew door, to fetch him away post to a dying patient ; by which means he draws the Eyes of the whole Congregation after him ; but instead of going to the pretended House of Visitation they both drop into a *Cabaret* there to pass the fatigue of a Forenoon *Sunday*. This knack of confederacy is to be repeated several Dominical days, until it hath made an impression on the People that he is a man of importance and of great Physick business." Then, as his wont is, he proceeds from the general to the particular :

"Thus I remember two Physicians at *Par.* grew famous ; the one being called *Le Sieur de Tattle*, had by frequenting the Convents of all Sects, made a vast inroad into the good opinion of the Zealots, and by that means halled in Shoals of Patients, whereof three fourths within his forty years practice are not to be spoken with on this side the Moon. The other was the *Sieur Phlegmatique*, known better to most men by that Name than any other ; In his younger years the dulness of his Apprehension, the imperfection of his Memory, and the natural sluggardness of his Mind (all contributing to a very slender proficiency in his *Latin Grammar*) made a Diagnostick to his Parents, that he was gifted with too little Sense and Eloquence for a Lawyer, too shallow a Memory for a Preacher, and therefore what should they make of him but a Physician, arguing that his heavy dulness would grow up into Gravity, his minute Apprehension would be over sufficient to understand a Disease, and his curtailed Memory would serve well enough to remember a Medicine. Into a Doctor by length of standing he was dubbed, and now to force a Trade of Pulse-

feeling and Piss-gazing, he lays his Plot in the Church, where his constant appearance with a broad-brim'd Hat, the little Band, an austere Gravity, and dull Countenance, soon gained him the Title of an Honest Conscientious knowing Physician, which character happily commends him to an Hospital, the reputation whereof, how undeservedly soever, brings any man into vogue, as it did also him, whom succession of time at least creates Father of the Family of Physicians, still endeavouring to mimic the part of an Honest Conscientious man, and how far in that he acted the Hypocrite, this subsequent narrative of his uncharitableness will attest, *viz.* a poor woman accosting him with an Urinal of her sick Husbands water, and lest that should puzzle him, doth express particularly all the grievances, complaints, and symptoms of the poor labourer, that in this condition was obliged to receive Alms from the Parish, being indeed incapable of getting his Bread by his Sickness. The Doctor having given the round toss to the Urinal, instead of the courteous smile due to the Rich for their Fees, frowns on the poor Creature, and asks her, *Whether her Husband had forty Pound to spend on a Physician*, she answers, *Her Husband was a very poor man*; to this the Doctor replies, *Woman, what do you come to me for then*: However she had a Groat, which was all she had left in the world, and offer'd it to the Doctor for casting the water, which he had the Conscience to accept."

Clearly Gideon Harvey was a medical Ishmael whose hand was against every man. He cannot therefore be accepted as an entirely trustworthy authority. But his "tract" has an historical interest as throwing a side light, lurid perhaps but not the less instructive, on the medical profession as it existed in the days of the Merry Monarch.

Reviews of Books.

Transactions of the Section of Laryngology and Otology of the American Medical Association. 55th Annual Session held in June 1904.

THE present volume makes us regret that our own British Medical Association does not also issue our analogous proceedings in a bound volume. This production of our American confrères is full of good things. To every worker in the speciality it is of the greatest value. We are glad to notice that an index has been added, but suggest that it might be more extensive.

Transactions of the Clinical Society of London. Volume 37. Pp. 273. 11 plates, 15 figures. London: Longmans, Green & Co.

THIS volume contains an account of the proceedings of the Clinical Society during the session between October 1903 and May 1904. There are many very interesting communications, amongst which we would draw attention to the two upon Hæmorrhagic Pancreatitis, and one by Dr. Frederick E. Batten, upon a case of Myositis Fibrosa, with an account of the pathological examination. There is one photograph of the boy showing the position in which he habitually sat, and a plate with two figures showing transverse sections of voluntary muscle illustrating the morbid changes which take place in this disease. Six communications deal with various blood diseases, and there is an account of two cases of a tumour of the left auricle of the heart, simulating Mitral Stenosis. The plates are all exceedingly well done and the figures are clear.

International Clinics. A Quarterly of illustrated Clinical Lectures and especially prepared original Articles on Medical Subjects and other Topics of interest to Students and Practitioners. Vol. III. Fourteenth Series. London: J. B. Lippincott Company.

THIS volume commences with a number of articles upon Syphilis, of which two are written by Dr. Alfred Fournier. Under the heading "The differential diagnosis of Syphilitic Eruptions," written by Dr. A. H. Ohmann-Dumesnil, there are many excellent and instructive plates illustrating syphilitic skin eruptions. The treatment of the digestive disturbances occurring in Pulmonary Tuberculosis, of Chronic Constipation by the rest-cure, and of Diabetes Mellitus, is discussed at length. There is a lecture on "Observations on Indigestion" by Dr. W. H. Allchin, one on Mitral Obstruction and Chronic Bronchitis by Dr. Katzenbach, one on Diseases of the Liver by Dr. Bishop, and a very interesting article on Scurvy by Dr. Andrew Duncan. Under the heading "Surgery," Umbilical Hernia in the female is considered. There is, too, an interesting account of two cases

of foreign bodies in the Bronchi. One of these was a nail, which was located by bronchoscopy and successfully removed by M. Guisez with an electro-magnet. Dr. Purves Stewart contributes an article upon the technic, diagnostic significance and therapeutic application of lumbar puncture. In the gynaecological section there is an article on the non-operative treatment of disorders of Menstruation, and an able article on hæmorrhage at and after the menopause by Dr. Cuthbert Lockyer. The volume closes with an account of Paralysis Agitans with two typical illustrations.

Transactions of the Medico-Legal Society. Edited by STANLEY B. ATKINSON, M.A., M.B. Volume I.

THIS little volume of 100 pages contains some excellent reading. In an inaugural address delivered to the Society in November 1902, Sir Wm. Collins, the first President, reviews the growth of medical jurisprudence in a short historical sketch, commencing with the dim age of Menes, and continuing to the more modern days of Caspar. He thence proceeds to suggest a multitude of subjects that may fitly form food for study and discussion among the members. He readily admits that in many parts of the field of legal medicine there is ample room for improvement. If the Society keep pace with the programme set it, we should hear of some excellent work accomplished. An instructive article comes from the pen of Dr. Harvey Littlejohn on medico-legal post-mortem examinations.

There are also instructive papers on impulsive insanity, and the overlying of infants, contributed respectively by Dr. Claye Shaw and Dr. Wynn Westcott. Mr. Wellesley Orr writes an interesting article on A Plea for Cremation, and Mr. Henslowe Wellington an able paper on reasons for the addition of the phrase "whilst temporarily insane" to verdicts in cases of suicide. Earl Russell's essay on the weight to be attached to medical evidence, closes a volume bristling with burning questions of the hour.

Antenatal Pathology and Hygiene. The Embryo. By J. W. BALLANTYNE, M.D., F.R.C.P.E., F.R.S. (Edin.). Edinburgh: William Green & Sons. Pp. 697; 104 illustrations. Price 21s. net.

DR. BALLANTYNE'S second volume on the subject of "Antenatal Pathology and Hygiene," which deals specially with the embryo, is a worthy successor of the previous volume which dealt with the fœtus. The embryonic period is understood to extend from the end of the first week up to the end of the sixth week from the time of conception. It is with the pathology of this period only that this volume is concerned.

The subject is a vast one and at first sight hopelessly beyond investigation, but by dint of laborious collection of an enormous mass of material Dr. Ballantyne has succeeded to a marvellous degree in producing order out of chaos.

The stages of development in the embryonic period are first considered, and the various theories of the causation of monstrosities are reviewed. Dr. Ballantyne's arguments against the effect of maternal impressions are in our opinion not very convincing; but we have nowhere read any

discussion of this point in which the subject is treated in so interesting a manner.

Then follows a consideration of the various malformations which have been observed, and here again there is everywhere evidence of the most laborious collection of material; an enormous number of references are given, and lucid accounts of the anatomical conditions, with excellent illustrations, make the whole subject one of fascinating interest.

It is noticeable in this volume as in its predecessor that the author sometimes displays a curious knowledge of foreign literature, whilst the writings of English observers, at least as valuable, are passed over without mention.

The closing chapters deal with such curiosities as joined fœtuses (poly-somatous terata!) and multiple pregnancies, to which certain women show a curious tendency.

Not the least interesting chapter in the book is the last which deals only too briefly with the deep question of heredity. This from the author's standpoint is mainly a study of the physiology and pathology of the egg and the sperm-cells. His remarks on this subject are well worth careful study for they are full of thoughtful suggestion, but the conclusion of the whole matter is much the same as that arrived at by Oliver Wendell Holmes that "two and two do not always make four in the matter of heredity; they may make five, and sometimes they make three."

Infantile Mortality and Infants' Milk Depôts. By G. F. McCLEARY, M.D., D.P.H., Medical Officer of Health of the Metropolitan Borough of Battersea. London: P. S. King and Son. Pp. 135. Price 6s. net.

THIS little book is a useful summary of the present position of municipal effort for the prevention of infantile mortality by controlling the feeding of infants. In his opening chapter the author considers the decline in the English birth rate, and quotes statistics to show that since the period 1851-1855, when the birth rate was 33·9 per 1,000 population at all ages, it has fallen gradually, and since 1871-1875 has fallen steadily to 27·9 per 1,000 in 1904. He apparently overlooks a possible and almost certainly very grave fallacy in his argument, for he offers no information as to the section of society in which this decrease in the birth rate is occurring. It is more than probable, indeed figures have been published to show, that this failure of birth rate is not in the class which is likely to be affected by municipal infant feeding, but is amongst the middle class and the well-to-do. But there is another side to the question which he does not mention. This municipal feeding is not merely municipal trading, it is municipal "charity," as is evident from the financial details which the author wisely includes in his book.

An account is given of the French institutions for the supply of milk for infant feeding amongst the poor, and also of the American depôts of the same kind; and a comparison is drawn between these and the British milk depôts. The book is profusely illustrated, but a considerable proportion of the illustrations might have been dispensed with, for they represent merely groups of people, or outsides of houses or insides of rooms, which in no way help to elucidate the subject. The book is, however, well worth perusal, and we can recommend it to all who are interested in the social problem of infantile mortality.

The Chief Operations of Ophthalmic Surgery. A Practical Guide for Students.

By HAROLD B. GRIMSDALE, M.B., B.C., F.R.C.S., Assistant Ophthalmic Surgeon to St. George's Hospital, Surgeon to the Royal Westminster Ophthalmic Hospital, &c. Pp. 144. Figures 23. London: *The Medical Times, Limited*. Price 5s.

In the preface to this little book the author states that its main object is to enable the student to learn—so far as is possible, by actual practice on dead animals—something of the chief operative procedures in ophthalmic surgery. We can only add that for this purpose the work is admirably adapted. The operations are clearly described, step by step, and a student who wishes to practise the more important operations upon the eye of the pig will find this book a most useful guide. The book is written by one who is an experienced operator, and an experienced teacher of operative ophthalmic surgery, so we consequently find the various difficulties met with in operations clearly set forth, and the means described, by which they can be more readily avoided. The twenty-three figures are very roughly drawn, and we consider that in such a book as this much more care should have been bestowed upon the production of these. The printing is not good, while the binding is bad, and the paper worse. Should another edition be called for, we hope to see vast improvements in the get-up of the volume.

The Arris and Gale Lectures on the Neurology of Vision. By T. HERBERT

PARSONS, B.S., D.Sc., F.R.C.S., Assistant Ophthalmic Surgeon, University College Hospital; Curator, Royal London Ophthalmic Hospital; Lecturer on Physiological Optics, University College, London; Arris and Gale Lecturer, R.C.S. London: Hodder and Stoughton.

LECTURE I. deals mainly with the afferent paths concerned in vision, and includes the results obtained in six experiments performed by the writer upon monkeys. Lecture II. is devoted to the innervation of the pupil, but in the pamphlet this has been considerably extended, and a historical summary of the subject added. There is a very useful plate which clearly sets forth the paths of the efferent pupillo-constrictor and pupillo-dilator fibres. Dr. Parsons is to be congratulated upon this excellent little monograph; the numerous references are especially useful.

Diseases of the Eye. By L. WEBSTER FOX, A.M., M.D., Philadelphia. 584 pages. Five coloured plates and 296 illustrations. London: Sidney Appleton. Price 18s. net.

DR. WEBSTER FOX's book is attractive in appearance, well written, and profusely illustrated. Its arrangement differs somewhat from similar works of the same variety, in that the various parts of the eye are taken and discussed in their order from within outwards, and refraction and the ocular movements are the last things treated. The account is based on a series of lectures given by the author, and contains his ideas on various subjects rather than those more usually accepted. The illustrations vary somewhat in merit, but on the whole they are good; and the work will compare favourably with many of those which are older and better known.

Manual of Serum Diagnosis. By S. O. ROSTOSKI, University of Würtemberg. Authorised translation by Dr. CHARLES BOLDUAN. First edition. Pp. 86. Figures 6. New York: John Wiley and Sons. London: Chapman and Hall, Limited.

THIS little volume is one of the best summaries on the subject of serum diagnosis, and we heartily congratulate Dr. Charles Bolduan, of Brooklyn, on having given to us such an excellent English translation. The book is thoroughly up to date and includes some important recent work such as Ficker's Typhoid diagnostic, the test with Formalin Typhoid Cultures and Para-dysentery. In the early part of the book there is a brief account of bacteriolysins and agglutinins. The serum tests for Typhoid and Paratyphoid are fully discussed. There is an excellent chapter upon Precipitins as diagnostic agents, and in it the forensic blood test is carefully described. We recommend those in the profession, who wish to keep themselves abreast of the times with regard to blood tests, to carefully study this little monograph.

The Infectivity of Enteric Fever. By ALEXANDER COLLIE, M.D., late Clinical Instructor at the Eastern Hospitals, &c. Bristol: John Wright & Co. Pp. 47. Price 1s. 6d. net.

DR. COLLIE in this brief monograph has brought together a good deal of evidence to upset the usually-accepted view of the water-borne nature of the outbreaks of enteric fever at Caius College, Festiniog, and Wicken-Bonant, pleading for a recognition of the infectious nature of this disease, and its communication from person to person. Knowing, as we now do, the wide distribution of the *bacillus typhosus* in the body, and its frequency in all the secretions and excretions of the patient, there is much to be said in favour of Dr. Collie's thesis, and we think that it is more generally recognised than he seems to suppose. On the other hand, bacteriology teaches that the bacillus may remain in the body of the convalescent for a long period, and thus infection may be introduced into localities without its being possible to trace it to its source.

Medical Diagnosis. Special Diagnosis of Internal Medicine. A Handbook for Physicians and Students. By Dr. WILHELM V. LEUBE, Professor of Medicine and Physician-in-Chief to the Julius Hospital at Würzburg. Authorised Translation from the 6th German edition, edited, with annotations, by JULIUS L. SALINGER, M.D., late Assistant Professor of Clinical Medicine in the Jefferson Medical College, &c. London: Sidney Appleton.

WE do not doubt that Professor Leube's book was originally of considerable value, but the translator has done his best to rob the work before us of any prospect of its being read. We have come across a good many bad translations in our time, but we can confidently state that this surpasses all previous example. That the translator does not know German is proved by such a sentence as the following: "This is shown partly by the fact that wounds heal badly, *respectively* become gangrenous, partly by the appearance of spontaneous gangrene." &c. (The *italic* is ours.) That he does not know English either appears from such a gem of diction as: "It is of greater

importance than the relatively insignificant quantity of albumen that the latter, corresponding to the fact that albuminuria is dependent upon the energy of the heart, varies considerably with the present intensity of the latter." As we find in one diagram a part of the brain described as the "vermis superioris" we may gather that ignorance of Latin is another of his accomplishments. We are sorry for Professor Leube, who authorised a translation of his work into English without being assured of the ability of the translator.

The Microscopical Examination of Foods and Drugs. A Practical Introduction to the Methods adopted in the Microscopical Examination of Foods and Drugs, in the Entire, Crushed, and Powdered States. By HENRY GEORGE GREENISH, F.I.C., F.L.S. Pp. xxii and 321. 168 illustrations. London: J. and A. Churchill. Price 10s. 6d.

THE application of the microscope to the study of foods and drugs can hardly be said to be of recent date, seeing, as Professor Greenish points out in his preface, that it was seriously made by Dr. Arthur Hill Hassall about the middle of the last century. The progress, however, has in this country been very slow. And, although the author has written a book of altogether English origin, we are still without a book in any degree comparable with the *Anatomischer Atlas* of Tschirch and Oesterle or the *Traité Pratique de Micrographie* of Gérard. Professor Greenish's book is divided into twelve sections, treating of Starches, Hairs and Fibres, Spores and Glands, Ergot, Woods, Stems, Leaves, Barks, Seeds, Fruits, Rhizomes, and Roots. The number of foods is so small as scarcely to warrant the foremost place in the title, and there are two or three articles which do not fall within the title at all, namely, jute, manilla hemp, and wool. If these substances are worthy of notice, we cannot understand why silk should be omitted. For those who used to be acquainted with the anatomical and histological features of drugs Professor Greenish furnishes an introduction which will be indispensable to those who are dependent upon English for their information. It may be thought by some persons that there is evidence of a want of proportion in the treatment of the various articles. Cinchona Bark occupies less than three pages, while Cardamom fruit fills twelve pages. We are not disposed to think so when we remember that the book is intended as an educational introduction to the study of the subject. Since this is its purpose, we venture to suggest that, out of four rhizomes selected, three from the Zingiberaceæ are too many.

The appendixes, dealing with free reagents and the reactions of the elements of vegetable tissues and cell-contents, are very useful, and are not overburdened with useless methods of examination.

Social Disease and Marriage. By PRINCE A. MORROW, A.M., M.D.; Emeritus Professor of Genito-Urinary Diseases in the University, and Bellevue Hospital Medical College, New York, &c. London: Sidney Appleton.

THE object of this work is to set forth clearly the dangers introduced by venereal diseases into marriage, to indicate the most effective means of preventing those dangers, and to formulate rules for the guidance of the practitioner, to enable him to safeguard the helpless and innocent from

infection. The book is subdivided into three sections: Gonorrhœa and Marriage, Syphilis and Marriage, and Social Prophylaxis. It deals therefore with some of the most serious problems of social hygiene, and coming from the pen of such an authority as Dr. Prince Morrow, it is a valuable addition to medical literature. If it achieves the circulation it deserves, it should in itself be a significant factor in the prophylaxis of venereal disease, and should be the means of saving many victims from the scourge of "syphilis insontium."

Though written primarily for the medical profession, it is a work the perusal of which will well repay the attention of the father of a family, or of the young man contemplating matrimony, for it will enlighten them on a subject on which they were probably profoundly ignorant, and one which is, at any rate in this country, unfortunately, owing to mock modesty, relegated to the background.

The author points out that gonorrhœa is quite as formidable a social plague as syphilis, owing to its greater frequency, the persistent vitality and virulence of its germs, and its serious menace to the health and even the life of its victim. Latent gonorrhœa is too often ignored, and a microscopical and bacteriological examination of the urine of anyone who has ever had gonorrhœa should be insisted upon before permission is given for him to marry.

In the case of syphilis, there are three factors to be considered before sanction should be given to marriage: the risks of contagion of the wife, the risks to the offspring, and the risks to the individual himself. The general rule is formulated that a period of four years should have elapsed since the chancre; that for the last twelve or eighteen months of this period, the patient should have been free from all manifestations, and that he should have received an adequate anti-syphilitic treatment.

As regards prophylaxis, the author rightly says that the most effective remedy available to modify the appalling evils, moral and physical, which spring from venereal diseases, is the general dissemination of knowledge respecting the dangers and modes of contagion of those diseases.

Gall-Stones and their Surgical Treatment. By B. G. A. MOYNIHAN, M.S. (Lond.), F.R.C.S., Senior Assistant Surgeon, Leeds General Infirmary. Pp. 386. London: W. B. Saunders & Co. Price 17s. net.

THIS book contains a detailed account of the etiology, pathology, clinical manifestations and operative treatment of gall-stones, together with a brief account of the general anatomy of the gall-bladder and bile ducts. It contains 71 illustrations, some of which are beautifully coloured, a circumstance which considerably enhances their value. Of the figures some are illustrations of photographs of the more important pathological specimens, selected from the larger pathological museums in London. These of course add to the value of the book. As in previous publications, the author has in this added brief accounts of cases, which he has seen both in private and hospital practice, some of which have been previously recorded elsewhere. Throughout the book, Mr. Moynihan recommends surgical treatment for gall-stones at an earlier period of the disease than has hitherto been customary. With this of course surgeons will readily agree. We can confidently recommend the work to all practitioners interested in diseases of the liver and gall

bladder. It is worthy of careful study, and on the particular subject is one of the best we have seen.

Lectures on Diseases of the Stomach and Intestines. By BOARDMAN REED, M.D. Figs. 112, pp. 1021. Philadelphia: E. B. Treat & Co. Bristol: J. Wright & Co. Price 21s. net.

THIS is a very bulky volume, as indeed any treatise must be which at the present time attempts to deal in an adequate manner with the vast subject of diseases of the stomach and intestines. The author, in his preface, anticipates the possible criticism of any captious reviewer as to the necessity for adding one more to the numerous works on these subjects which are already available to the English reader, by pointing out that there is no such treatise in one volume devoted to the whole subject of gastric and intestinal affections, and modestly says that he cannot hope to rival the numerous works dealing with one or other of these two parts of the alimentary canal in completeness, erudition, and pathological detail. The eighty-two lectures, of which Dr. Boardman Reed's treatise is composed, are divided into four groups or parts dealing with (i) The anatomical, physiological, chemical, and diagnostic data; (ii) The methods of examination; (iii) The methods of treatment; and (iv) The "gastro-intestinal clinic," which occupies rather more than three-fifths of the volume, and deals seriatim with the diseases of the stomach and intestines. The subject of appendicitis is considered in forty pages. Without entering into any detailed criticism, it may safely be said that the clinical character of the work, though not exhaustive, is generally trustworthy, and will probably meet the requirements of general practitioners to whom it is mainly addressed. On the other hand it cannot, as its bulk suggests, be regarded as a standard source of reference on the subject, since it is wanting in detail, especially, as the author is the first to admit, in morbid anatomy and pathology, and does not contain sufficient bibliographical references.

The Open-air Treatment of Pulmonary Tuberculosis. By F. W. BURTON-FANNING, M.D., Cantab., Physician to the Norfolk and Norwich Hospital, Honorary Visiting Physician to the Kelling Open-air Sanatorium. Pp. 172. London: Cassell & Company, Limited. Price 5s.

THIS little book deals fully with the details necessary for carrying out the modern methods of treatment of pulmonary tuberculosis. The author has had a large experience at two large sanatoria, and, in the present volume, he very clearly points out the great advantage to the patients of modern methods as compared with the older methods. To appreciate the book fully it must be read carefully, and we can confidently recommend it to all those, who have to treat patients suffering from tuberculous affections of the lungs. The book is well got up, and is of such a convenient size as makes it easy to read. Towards the end of the book there are illustrations representing various forms of shelter, of which two represent the cubicles used at the Kelling Sanatorium.

Notes by the Way.

**Are we
Degenerating ?**

DURING the South African War there appeared in the *Times* a letter purporting to be from an old Boer, in which, among many other uncomplimentary remarks, there was much scoffing at the physical worthlessness of the British soldier. That there is a good deal of truth in these jibes, a glance at the line or volunteer regiments drawn from the population of large towns must convince any unbiassed observer. When it is considered that the regular soldiers are to some extent picked men, one cannot help wondering what manner of men can be the would-be warriors rejected as unfit for service. As the official reports show that the number of these is very large, it is difficult to avoid the inference that the nation, as far as bodily strength is concerned, is on the down grade. Yet, taking the British race as a whole, there appears to be no reason to think that there is any physical degeneracy. The danger is that as country folk are driven more and more by economic stress to the towns, the influences making for degeneracy must correspondingly increase. How this tendency can be counteracted is a problem of vital importance to us as a nation.

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**Schemes for
Physical
Betterment.**

IF no solution is found, it will not be for want of instructors to tell us how the thing should be done. Their teaching would be more effective could they but agree among themselves. Meetings have been held at which the doctrine was proclaimed that the way to physical salvation lies through gymnastics and Swedish exercises ; schemes for making the whole nation undergo a course of such training have been propounded, which bishops have blessed and learned doctors have approved. But a leading medical journal unkindly denounced these schemes as "hygienic moonshine." The public is naturally confused by the cries of rival prophets, each of whom professes to have the true light. The formation of the National League

for Physical Education and Improvement will serve a useful function if it does nothing more than co-ordinate into a strong united movement the isolated efforts already being made. All lovers of their country must share the hope that the movement will spread over the whole British Empire, and that every subject of the King, whether man, woman, or child, will be better fed, stronger, better educated and better in morality, owing to improvement in physique.

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Difficulties in the Way.

It is a noble ideal and one that every patriot must eagerly wish to see realised. In the glow of enthusiasm kindled by the prospect, however, the difficulties in the way are scarcely seen in their true light. The physical regeneration of the people is not altogether, as Mrs. Bramwell Booth put it, a question of good mothers. It is still more a question of good fathers and good forefathers. The problem is not simply how the environment of the rising generation can be improved, but how the operation of the stern laws of heredity can be prevented. To paraphrase a saying of Oliver Wendell Holmes, the treatment of the evil with which we now seek to cope should have been begun three or four centuries ago. The improved hygiene of which we are justly proud, though a boon as far as the mere preservation of life is concerned, is by no means an unmixed blessing to the race. For it is the weaklings who are saved from the weeding-out process applied by Nature with ruthless hand to the unfit; and their puny and often tainted offspring help to lower the standard of the national physique. The Spartans, who eliminated all weakly and deformed children, knew how to prevent physical degeneration. As it is unlikely that the League formed under the auspices of the Bishop of Ripon, Sir William Broadbent, the Lord Chief Justice, Sir James Crichton-Browne, and the many other eminent philanthropists who lately assembled at the Mansion House, will adopt so drastic a measure, it may be predicted that their most praiseworthy efforts for the physical betterment of the nation will scarcely bring about the fulfilment of Walt Whitman's dream of a land peopled by forty millions of magnificent persons.

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Medicine as a
Means of
Livelihood.

It has often been remarked that the medical profession is the only one that works for its own undoing. To it mankind owes hygiene, which has already rid the world of not a few scourges, and which may in time stamp out disease. The triumph of hygiene means the passing away of medicine. The art of healing must necessarily become superfluous when there is nothing to heal. Already there are signs which seem to indicate that at least in certain directions the doctor's occupation will at no very distant day be gone. It is becoming increasingly difficult for the medical practitioner to make a living. As a friend of ours tersely put it, "There's not enough acute disease to go round." Other causes contribute to the same end. We have taught the public how to prevent disease, and the manufacturing chemist has taught them how to treat themselves. Hospitals send the rain of their free advice and physic alike on the poor and on those who can well afford to pay. Massage, electricity, and special forms of treatment are largely in the hands of men who are not of the household of medicine. Quacks of all kinds compete with the lawful practitioner. Should the doctor plead *Faut vivre*, the public will soon be in a position to reply, *Je n'en vois pas la nécessité*. It is difficult to indicate a remedy for a state of things that is largely a consequence of the operation of inexorable economic laws.

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Offices for
Practitioners.

THE following letter, which we have received from a practitioner in the West End of London, contains one or two suggestions that may supply food for thought :—

"I feel sure you will be interested in a fact which is, I believe, known to most practitioners in the West End of London—I cannot speak from personal experience of other quarters, but it may be the same, viz., that the practice of medicine is not so lucrative a means of livelihood as it was some years ago. It never was a means of amassing fortune, but now I doubt if, except for a very fortunate few, it is even a means of providing sufficient for old age, and leaving a family in anything but quite straitened circumstances. The reasons for this very unpleasant state of things are, to my

mind, obvious, but it is not the purpose of this letter to discuss them. I will merely enumerate them, viz., on the one hand increased competition for practice in the West End of London, the progress of specialism, greater knowledge of things medical among the public, tabloid medication, the introduction of certain modes of treatment carried out by unqualified practitioners, by Swedes, electric light institutions, &c., the tendency among the richer classes to remain in London for only short periods; on the other hand, the increased cost of living, rent, taxes, &c., with no proportionate increase in medical fees. In fact, I regret to say, there is a marked tendency to cut them by some members of the profession. Then there is the increased cost of carrying out the mere practice of medicine, owing to instruments and methods of research being required.

"The main object of this letter is to suggest a means whereby the medical profession can be made a career in its financial aspect. The only possible chance of success seems to me for us to cut down our expenditure. This could be easily done by two or three doctors in one neighbourhood taking a house together, and so dividing the expenses of the upkeep of a much larger and more expensive house than one requires for the use of oneself and family. A private telephone could be fixed to the houses of those who do not live in the central office, and all messages could be sent on or switched through at once, the dwelling-house being in some less expensive street near by. Rent, servants, and the many attendant outgoings of a large house, could thus be saved. This plan is adopted in America. How often has one not been asked by American patients: 'Doctor, what are your office hours?'

"In conclusion, say a practitioner making £2,000 a year: he has to live in a house, the probable rental value is, with taxes, £300 to £350 a year; for the upkeep of this he will have to keep at least five servants. If my suggestion was adopted, he could live in a house of £100 a year all told, with three servants, and would thus probably be able to reduce his expenditure by £400 to £500 a year at least. I dare not trespass on your space more, but I think I could produce figures to prove these statements."

The whole question is a very important one to doctors, and its discussion cannot fail to be helpful. Perhaps some other

correspondents will give the readers of THE PRACTITIONER the benefit of their views.

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**Oxford's New
Regius Professor.**

PROFESSOR Osler has now taken up his abode at Oxford. He comes among us, not as a stranger, but as one held in especial honour in the "old country," which has always grudged the possession of him by those to whom he was a foreigner. William Osler is one of the few physicians of really world-wide celebrity. He is besides a man of the widest knowledge and the broadest literary culture. To such a man Oxford will be like a natural home. Our premier University has now a medical school in being; it may be hoped that, under the vivifying influence of the new Regius Professor, it will grow into a centre of teaching and research worthy of the reputation of the academic cradle of Thomas Willis, Richard Lower, Thomas Wharton, Christopher Wren, and Thomas Sydenham.

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**Provincialism in
Plague Research.**

A CORRESPONDENT, with special experience of plague work in various places, writes with reference to a paragraph which appeared in THE PRACTITIONER for June: "You have at last spoken the truth." He goes on to say that, although during the last eleven years there have been opportunities for amassing a large amount of information, unfortunately very few men have had a fair chance of studying the disease except in the districts in which they happen to have been placed when an outbreak occurred. Little has yet been done to bring their experience into line. The tendency of all local observers has been to place emphasis on one or two particular points. For instance, Dr. Ashburton Thompson, of New South Wales, recently stated that the reason why his government had been so successful in plague fighting is that they recognised that the rat was the *sole* cause of mischief; and that the reason why the Indian Government had been so unsuccessful was that they did not recognise this. Our correspondent says that if Dr. Thompson had been in Poona during the second severe epidemic there, he would never have given forth this dogmatic

utterance, as, for all practical plague purposes, rats were absent. Had he been in San Francisco during the plague outbreak there, he likewise would have seen that animal infection was infinitesimal.

The Commission sent to India a few years ago did nothing more than accumulate a mass of useless, because unsifted, evidence. Our correspondent thinks that if four or five prominent scientific sanitarians, of a forcible administrative type, were made to devote their lives to plague work in the Empire, in the same way that Local Government Board inspectors work in Great Britain, some good might be effected. He adds, "A more Imperial question than plague can scarcely be imagined, and yet there is no central 'Defence Committee,' no Premier to do the thinking." How lightly Premier and Parliament think of the peril that menaces India was strikingly shown not long ago when Sir Walter Foster's attempt to introduce a debate on the subject was defeated by the Government, supported by some of his own side !

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**The Title of
Apothecary.**

WE have received from Major G. Herbert Fink, I.M.S. (Retd.), a long letter relative to the article entitled "The Evolution of the Apothecary" which appeared in the June number of this Journal. Reference was there made to the fact that the "Apothecary" is now endeavouring to get his title altered into something that shall more accurately express his true functions, and it was added that a similar attempt had been made before the middle of the last century. We gather that Major Fink has somehow derived the impression that we wished to imply that nothing should be done to remove this grievance. We are by no means sure that we correctly apprehend his meaning, for his letter is very long and not very lucid. It, however, he imagines that we are not in sympathy with the desire of the Licentiates of the Society of Apothecaries to secure a designation that will show the public that they are fully qualified practitioners of medicine and surgery, we beg leave to assure him that he is quite mistaken.

Practical Notes.

THE PHYSIOLOGY OF THE DIGESTIVE PROCESS—
ENTERIC DIGESTION.—In the mucous membrane, all along the small and large intestine, is a large number of simple tubular glands, known as Lieberkühn's crypts or glands. These are lined by columnar epithelial cells, the function of which is to secrete the digestive juice known as the *Succus Entericus*. Recent investigations by Pawlow, Starling, and Otto Cohnheim show that the succus entericus has most important actions in the digestion of food. It has already been stated that quite fresh pancreatic juice has no action whatever upon proteid food, but that in the presence of succus entericus, pancreatic juice has a very important proteolytic action. The succus entericus contains a body, which is spoken of as a "ferment of ferments," and it is called *enterokinase* or *zymolysin*. Its action is to convert inactive trypsinogen into the active enzyme trypsin, and so to render the pancreatic juice powerfully proteolytic. At the same time, the *enterokinase* has a slight effect in increasing the activity of the steapsin (fat-splitting ferment) of the pancreatic juice. It is found that succus entericus has no action upon ordinary proteids, such as white of egg, but it is capable of digesting caseinogen, the most abundant proteid of milk. It will hence be understood that the young child is able to digest its proteid food, which is derived from milk, although pepsin of the gastric juice and trypsin of the pancreatic juice be absent. Succus entericus contains a ferment which has been named *erepsin*. This is capable of breaking up proteoses and peptone into simpler substances, such as leucine, tyrosine, the hexone bases (lysine, arginine, histidine), and ammonia. Succus entericus has a very important digestive action upon carbohydrate food. To a slight extent, it is capable of converting starch into sugar, but its main action is to convert cane-sugar by a process of hydrolysis into dextrose and levulose; maltose, a product of the action of ptyalin and amyllopsin upon starch, is converted into dextrose, and lactose or milk-sugar is converted into dextrose and galactose, that is, there are many invert ferments included

under the term *invertin*, which are capable of converting the saccharoses ($C_{12} H_{22} O_{11}$) into the glucoses ($C_6 H_{12} O_6$). It will be seen, from the above facts, that the process of digestion does not consist of a series of isolated phenomena, but that each stage follows its predecessor in an orderly manner, and as the result of preceding stages. For example, the secretion of gastric juice depends to a certain extent upon the presence of saliva, the formation of *secretin* depends upon the hydrochloric acid of the acid gastric chyme, *secretin* stimulates the flow of pancreatic juice, and, to a certain extent, bile. Bile acids too aid the formation of more *secretin*. The proteolytic activity of the pancreatic juice and, to a smaller extent, its steatolytic activity depend upon the presence of the *zymolysin* or *enterokinase* of the succus entericus. On the other hand the presence of pancreatic juice is said to act as a stimulus for the tubular glands of Lieberkühn. At the same time, the secretion of succus entericus is normally excited by the mechanical stimulation of the food, as it passes down the small and large intestine.

HÆMORRHOIDS.—There are some important local anatomical predisposing causes of piles which must always be kept in mind.

1. The hæmorrhoidal veins, which contain no valves, are longitudinally arranged, and lie in the submucous tissue between the mucous membrane and muscular coats of the rectum. There are, however, circular rings of veins, situated at different levels, which connect the longitudinal veins. The longitudinal veins also pierce the muscular coat of the rectum, and, in this way, are liable to be compressed during straining, and the lower veins are ill supported during defæcation.

2. The superior hæmorrhoidal vein opens into the inferior mesenteric, the middle opens into the anterior division of the internal iliac, and the inferior opens into the internal pudic vein, which opens into the anterior division of the internal iliac vein, and, as the three hæmorrhoidal veins communicate with one another, there is here a free anastomosis between the systemic and portal venous systems, and these veins have to support the weight of the column of blood which is going to the liver.

Besides these anatomical predisposing causes of piles, there are direct causes to be considered, thus there may be a hereditary tendency to varicose veins, due, doubtless, to the fact that the vein walls are badly developed. *Pressure* upon the pelvic veins, or obstruction to the flow of the portal blood, such as occurs with pregnancy, fibroids and ovarian cysts, cirrhosis of the liver and alcoholic excess; and some *straining* to pass urine, which occurs with stricture of the urethra, chronic enlargement of the prostate and stone in the bladder, are also direct causes. Chronic constipation and the abuse of aloes must not be overlooked. Lastly, the possibility of local disease of the rectum, such as fibrous or malignant structure, must be remembered. We would emphasise the fact that, in all cases of hæmorrhoids, whether external or internal, it is most important to very carefully examine the rectum by digital exploration, so as not to overlook a possible local cause. The treatment of the condition must obviously depend upon the cause. For instance, should the cause be cirrhosis of the liver, the formation of the piles is nature's method of relieving the portal congestion, and so long as the hæmorrhoids are there, and bleed, so long will there be no ascites. The palliative treatment of hæmorrhoids consists in increasing the general tone of the patient by the use of tonics and cold baths, and in the administration of gentle laxatives, such as Pulvis glycyrrhizæ compositus ʒ i to ʒ ii, or Confectio sulphuris ʒ i to ʒ ii and Extractum cascariæ sagradæ liquidum ʒ i, which may be conveniently given early in the morning. The parts must be kept absolutely clean, a cold sponge or absorbent wool being preferable to hard paper, and an ointment such as Unguentum gallæ or Unguentum gallæ c. opio or Unguentum hamamelidis may be locally applied.

The following will be found a useful ointment :—

℞ Extracti Hamamelidis Liq.	-	-	-	i j.
Cocainæ Hydrochloridi	-	-	-	gr. viij.
Adipis Lanæ	-	-	-	ʒ ij.
Adipis Præp.	-	-	-	ʒ i.
Misce. Ft. Ung.				

Should the patient have an "attack of piles," which usually means some inflammation with thrombosis, he should be put to bed, the lower bowel carefully cleared by a simple enema

of warm water, hot boric acid fomentations should be applied, and, if the pain is very great, it may be relieved by a morphia suppository, containing $\frac{1}{4}$ grain of morphinæ hydrochloridum. Should the pain continue, it may be necessary to incise the inflamed pile and turn out the clot. Should these measures fail, and there be no other disease to which the piles are secondary, then some radical operation may be performed.

STIFF AND CONTRACTED JOINTS.—*Air-pressure in the treatment of stiff and contracted joints.*—In the *Münchener Medizinische Wochenschrift*, No. 17, 1905, Klapp describes how Bier and he have extended the use of their rarefied air treatment, for they have now applied it to moving stiff joints. The limb to be acted on is enclosed in a metal box, and the joint is brought opposite an opening in the box which is closed with a rubber-sheet. The whole limb is thus enclosed in an air-tight space, from which the air is now exhausted slowly, and to such a degree as is necessary. The rubber-sheet is wrapped round the joint, which is thus directly exposed to the external air-pressure, and thus a powerful equally distributed and continuous force is applied to it.

They claim that forced movements, brought about in this way, are free from pain, that the result leaves a feeling of freedom in the joint, and that by means of the passive hyperæmia induced during the operation, absorption of the inflammatory exudation is stimulated.

The knee, ankle, elbow, and wrist joints are all capable of being treated in this way, and good results have already been obtained. Flexion and extension can easily be arranged.

COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the July Competitions will be announced in the September number.

a.—The Subject of the Essay for August will be

The Treatment of Exophthalmic Goitre.

b.—Answers to the following questions are invited :—

1. What are the indications for removing the eyeball?
2. In what circumstances is the great trochanter displaced above Nélaton's line?
3. A male, aged 35, was admitted into hospital with this history. When a boy he had an attack of Typhoid Fever from which he recovered without complications. More recently he had been abroad. He had lived freely, taken plenty of beer and spirits, and never had very much exercise. Six months ago he had a sharp attack of pain in the abdomen, with renewed paroxysms, chiefly referred to the right hypochondrium, there was no jaundice but marked vomiting. In ten days he was quite well. Ten days ago, he had a sudden attack of pain accompanied by tenderness in the abdomen between the right hypochondrium and the right iliac region; he vomited a good deal. The pain and vomiting continued for four days, the vomit contained undigested food and bile. The temperature was raised and he had shivering attacks. On admission, he was a fat, pale individual, the conjunctivæ were yellowish, the skin was normal, tongue was furred. The heart and lung sounds were normal. The abdomen was slightly distended, its walls were, however, lax. There was some resistance in the right iliac region, the liver and spleen seemed normal. The pulse was 100, temperature 100°, urine normal. Three hours after admission he had a rigor which lasted ten minutes, the temperature rose to 103° and he sweated. For the next six weeks, he had an irregular temperature and frequent rigors, preceding the rise of temperature, which as a rule went to 104° or 105°, generally sweating was profuse. The urine was usually dark with a high specific gravity, it contained occasionally bile and a little albumen. The patient was constipated, the liver gradually enlarged upwards and downwards. The spleen also enlarged, there was also marked tenderness over the liver and spleen. The heart became weaker, and dullness to percussion was found during the later stages of the illness over the bases of both lungs. The patient gradually lost flesh and strength, but never complained of pain. Three days before he died he was seized with vomiting, which could not be checked, it increased in severity, and it was later accompanied by hiccough, these symptoms persisted and he died. What morbid conditions were found on post-mortem examination?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of September, 1905. No Essay must contain more than three thousand words, and the Editor reserves the right to publish any Essay, which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of September, 1905.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.

(2) The name or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

THE PRACTITIONER.

SEPTEMBER, 1905.

THE ENLARGED PROSTATE, ITS NATURE, SYMPTOMS AND TREATMENT.

By CUTHBERT WALLACE, M.B., B.S. (LOND.), F.R.C.S. (ENG.),

Surgeon to St. Thomas's Hospital, in charge of Out-patients; Assistant Surgeon, East London Hospital for Children.

[With Plates XII.—XV.]

STRUCTURE AND FUNCTIONS.

Comparative Anatomy.

THE prostate is the most constant of the secondary sexual glands, and is found in nearly all mammalia. At first it consists of a series of blind tubes arranged radially to the urethra. As we advance up the scale of animals the organ becomes more complex, and tends to gather into two masses situated, one on either side of the urethra, thus becoming a bilobed gland. In some animals, again, such as man and the dog, the two lateral masses fuse in front and behind the urethra, and the organ takes on a ring form with little external evidence of its compound nature.

Development and Growth in Man.

There are two theories regarding the development of the organ. Firstly, that it originates as an outgrowth from a mucous membrane of the urethra, and, secondly, that it arises from the genital tissue about Wolffian ducts. At birth, in man, it consists of small fibrous organ with little or no glandular tissue (Fig. I.). In this state it remains until the advent of puberty, when it begins to increase in size, the enlargement being mostly due to a growth of the gland tissue. Between 20 and 25 years it reaches its perfect development. In this condition it remains until old age, when, in a small number of cases, it undergoes atrophy.

Functions of the Gland.

There are two ideas in vogue regarding the function of this gland :—

- (1) That it is a sphincter of the bladder ; and
- (2) That it is a secondary sexual gland.

That it is a sphincter of the bladder is controverted by the fact that it is absent in the female, and that the bladder, after removal of the prostate, maintains its power of retaining urine.

That in certain animals the prostate is not situated at the neck of the bladder, and also from the fact that in many animals it is of such a form that it could not exercise the functions of a sphincter.

That it is a secondary gland is proved by the following facts :—

- (1) That it is confined to the male sex ;
- (2) That it grows at puberty with the other sexual organs ;
- (3) That it exhibits seasonal activity in such animals as the mole and the hedgehog ;
- (4) That it fails to grow in eunuchs, that is, in individuals who are castrated in youth ; and
- (5) That it atrophies after castration in adults.

It is most probable that the secretion of the prostate forms a vehicle and a nutritive fluid for the spermatozoa. On the other hand it must be remembered that fecundation of the female is said to have been produced by seminal fluid taken from the epididymis, the seminal fluid in such a case having no opportunity of being mixed with the secretion of the prostate.

External Characteristics.

The organ is pyramidal in shape, the urethral axis being vertical. It presents two surfaces, an anterior and a posterior, three borders, that is two lateral and a superior. The anterior surface is convex from side to side and from above downwards, the posterior surface slightly concave from side to side and almost flat from above downwards. Into this surface there enter, a little below its upper limit, the two vasa deferentia. The lateral borders are rounded and join together the anterior and posterior surfaces of the organ. The superior border is rounded and formed by the upper free extremities of the anterior and posterior surfaces. Some specimens show a slight indentation in the middle of this border. Behind, the posterior part of the

superior border is free where it is in contact with the vesiculæ seminales, but into the anterior or inner portion of this border, and into its whole extent at the sides and in front of the bladder are inserted the muscle fibres of the bladder, and so intimate is this connection, that it is impossible to say where the muscular wall of the bladder ceases and the stroma of the prostate gland commences.

The average weight is 5 drachms or 20 grammes.

Structure.

This is best studied by a series of sections taken at right angles to the axis of the urethra. For our purposes, it will be sufficient if we examine a section taken midway between the internal meatus and the lower extremity of the verumontanum. In the centre of such a section is seen the urethra which is here crescentic. Immediately posterior to this is the uterus masculinus, and on either side and a little behind this latter structure lie the ejaculatory ducts (Fig. II.).

The stroma is most marked in certain situations, namely :—round the urethra, in front and immediately behind the canal, and at the extreme circumferential portion of the organ. From behind the urethra, the stroma runs horizontally out towards the periphery where it joins with processes sent in from the outer non-glandular portion of the organ. The most anterior of these strands turn or curve forwards round the urethra. The portion of the gland immediately in front of the urethra is usually free from all gland tissue, and is made up entirely of the fibro-muscular tissue. To this, the name of anterior commissure has been given, and it most probably represents the point of fusion of the two lateral masses seen in the lower animals.

To the outer non-glandular portion of the organ the term "cortex" has been applied by Mr. Shattock. This seems a more convenient term than "capsule," since this layer is incapable of being separated from the remains of the organ except by a process of cutting or tearing. The gland tissue is mostly found behind and at the sides of the urethra. It is important to note that there is gland tissue both in front and behind the ejaculatory ducts, which are thus firmly embedded in the substance of the gland. The ducts are not led in through any notch in the organ, but simply penetrate its posterior surface. There is no real division into lobes,

the portion of the gland which is usually spoken of as a third lobe is simply that portion of the gland which lies behind the ejaculatory ducts as they pass forward to join the urethra and the trigone of the bladder. On the anterior surface of the organ, and intimately blended with the cortex, lies a muscle consisting of striated fibres which goes by the name of Henle's muscle. Below, it is continuous with constrictor urethræ, above, it loses itself on the anterior surface of the gland. Towards its external or anterior surface, it presents well-marked bundles of muscle fibre separated by a small amount of areolar tissue. As we pass inwards towards the urethra, the muscle bundles become more and more widely separated by the fibro-muscular stroma of the gland until at length the latter predominates, the striped fibres becoming fewer and fewer until they altogether cease. Some time, however, before this happens the gland tissue makes its appearance, so that striped muscle fibre, fibro-muscular stroma, and gland tissue are all found in the same microscopic field, and, in certain cases, it is possible to see gland tissue with striped muscle fibres lying both on its central and peripheral aspect, so intimately is the striped fibre insinuated into the peripheral portion of the gland. I lay stress on this fact, since the presence of striped muscle fibre in the "capsule" of an enucleated prostatic tumour has been taken as proof that the whole gland has been removed.

Coverings of Prostate.

Surrounding the organ on all sides is a fascia derived from the recto-vesical fascia of the pelvis. It is important to note that this structure is not a dense fibrous plane like the fascia lata of the leg, but is really made up of a series of areolar planes. Embedded in these planes lie the veins which form the prostatic plexus. The veins do not completely surround the prostate, but are most marked on the anterior and lateral surfaces of the gland, so that, when viewed from above and in front, they form a "Y"-shaped collection of vessels, the stroke of the "Y" being directed towards the pubes.

THE ENLARGEMENT OF THE PROSTATE.

Nature of the Change.

It is generally believed that the prostate begins to enlarge at or about the age of 50 years, and it has been said that at

PLATE XII.

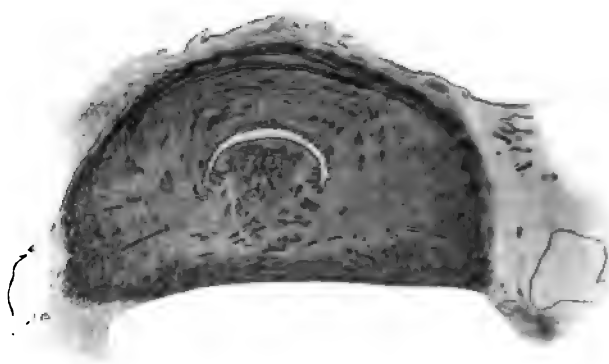


Fig. I.

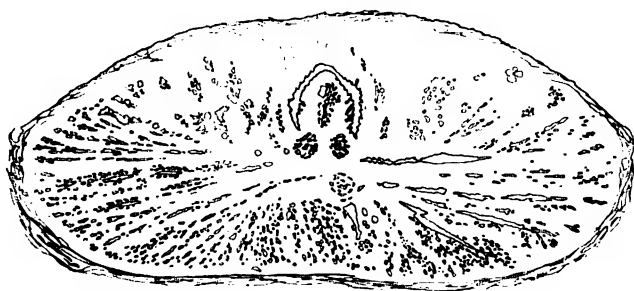


Fig. II.

PLATE XIII.

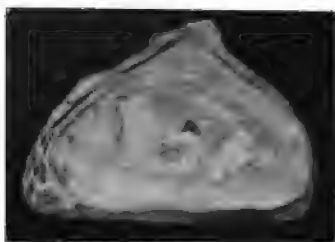


Fig. III.

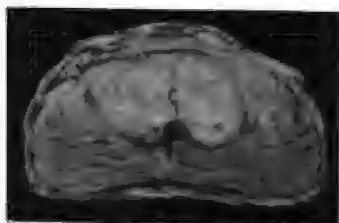


Fig. IV.

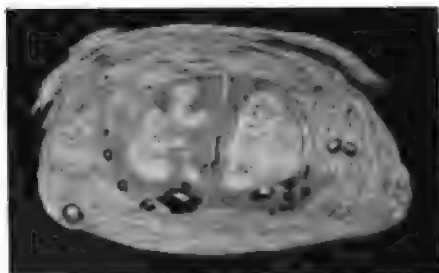


Fig. V.



Fig. VI.

60 years of age one man in three has some enlargement of that organ, but that only about half the number of cases show any clinical symptoms of such a change. On the other hand, some observers maintain that an enlargement of the prostate can, in a certain number of cases, be found at a very much earlier date.

It will now be convenient if, at this stage, we trace the different steps in the enlargement of the organ. The first indication of a change in a prostate in the process of enlargement is to be seen in the appearance of small white areas (Fig. III.). These at first are mere dots, and of very various shape. As time goes on, however, these areas assume a more or less rounded outline. They may be single or arranged in groups. At the same time the arrangement of the fibrous tissue is altered. It no longer runs out in straight lines from behind the urethra, but the strands take on a wavy course, and arrange themselves round the growing white (glandular) areas. There can often be seen in the same specimens, normal prostatic tissue, areas showing whitish spots, and ill-defined lobulated masses. Later the normal gland tissue becomes less and less obvious, disappears from the centre of the organ, and is only seen at its periphery. The whitish areas increase in size and become recognisable as "adenomatous" masses. The more rapidly growing areas increase at the expense of the more slowly growing ones, which are compressed and stretched over the surface of their more quickly growing neighbours. The tissue between the adenomata, composed partly of the fibromuscular stroma of the normal organ and partly of the stretched prostatic tissue, becomes circularly disposed round the gland masses. The adenomata may be either single or combined, that is to say, they may be composed of several adenomata bound together by one common envelope, or one adenomata may contain two or more smaller ones (Fig. IV.). By the time that the adenomatous changes have become well marked, the external form of the organ has undergone a change. The antero-posterior measurement approaches, then equals the lateral, so that the organ not infrequently becomes globular in outline, and its cross section becomes circular instead of being transversely elongated. There does not appear to be any definite relation between the size of the organ and the progress of the "adenomatous" change. From the disposition of the

gland-tissue in the normal prostate, it follows that the adenomata can develop in any situation around the urethra except immediately in front of the canal, where lies the anterior commissure. If the adenomatous change starts on either side of the urethra, it will form lateral masses of adenomatous tissue; on the other hand, should the change affect all the glandular portion of the organ alike, the adenomatous growth will surround the urethra everywhere except the front, and even here, by its growth, may eventually replace the fibromuscular anterior commissure. This form of overgrowth of the prostate is best described as an adenomatous hypertrophy, and is comparable in the adenomatous form of goitre. I shall have occasion later on to refer to rare forms of enlargement, such as the fibrous and the carcinomatous.

The Encapsulation of the Tumours.

The formation of the so-called "capsule" proceeds *pari passu* with the growth of the adenomata. This will be best understood by reference to Fig. V. This specimen was obtained, after death, from a man, aged 63 years, who died of a duodenal ulcer. There was no history of any vesical trouble. The section was taken at right angles to the urethra and through the middle of the organ. Most externally can be seen the recto-vesical fascia. In the centre is shown the prostate urethra somewhat distorted. On either side of the canal, though not actually in contact with it, are two commencing adenomatous masses. Surrounding these two central masses can be seen the outer part of the organ, the fibres of which have already taken on a circumferential direction and, except at one place to the left of the urethra, where an adenomatous mass is visible, no gland tissue is discernible to the naked eye, though its presence is indicated by the occurrence of numerous prostate calculi. It will be seen that an increase in the size of the central adenomata would have in time led to the condition seen in Fig. VI., namely, a central adenomatous mass surrounding the urethra, accompanied by an envelope containing at one spot a mass of gland tissue.

The rapidly growing gland tissue stretches and expands the circumjacent tissue over and around itself, the radiating fibromuscular bands lose their original disposition, and run in a wavy

course between the adenomata. As the adenomata grow, the circumferential part of the organ becomes laminated, the fibres being driven to take a more or less circular course when seen in a cross section of the organ (Fig. VI.).

ETIOLOGY.

Having traced the chief points in the appearances presented by the enlarged organ, it will now be convenient if we shortly examine the various theories that have been advanced to account for the senile enlargement of the gland. They may be enumerated as follows :—

1. That it is a senile fibrotic change shared by other organs of the body.

2. That it is produced by sexual excess.

3. That it is due to ungratified sexual desire.

4. That it is a change secondary to a degeneration of the bladder, and is an attempt to counteract the same.

5. That it is due in some way to the action of the testis (perverted testicular secretion).

6. That it is a change normal to advancing years.

7. That it is due to a chronic inflammatory process producing a cicatricial contraction, which ends in constriction of the gland acini or gland ducts.

8. That it is an inflammatory catarrhal process produced by septic organisms, which gain access from the bladder and urethra. The catarrh of the ducts is here believed to produce an obstruction of the lumen by a desquamation of the epithelium.

9. That it is a new growth of an adenomatous nature.

If these different theories are studied, it will be seen that some simply attempt to supply a cause for the increase, without entering into any consideration of the nature of that increase, while others attempt to supply a reason for the increase, and to afford an explanation of the appearances admittedly seen under the microscope. Of these nine theories, there are only three, namely, 7, 8, and 9, which require serious consideration. We will take them in order.

(7) That it is due to a chronic inflammatory process producing cicatricial contraction of the stroma. It is stated by the adherents of this theory that, if the contraction takes place at the periphery of the organ, the glands themselves die from

pressure, and the result is a hard cicatrised prostate. If, on the other hand, the contraction takes place near the urethra, the ducts are compressed, the contents of the glands dammed up, the lumen dilated, and the organ correspondingly increased in size. In other words, the enlargement of the organ is due to a cystic dilatation. This theory demands an exciting cause for the chronic inflammatory process, and it is suggested that this agent is to be found in a gonorrhœal infection. This is tantamount to saying that every man with an enlarged prostate must have suffered from gonorrhœa. This, I believe, is not in accordance with facts, and even the originator of the theory admits that gonococcus has not been found sufficiently often to warrant its acceptance as the cause of the disease.

(8) That it is due to a catarrhal inflammation produced by septic organisms which gain entrance from the urinary tract. Catarrh of the ducts is supposed to lead to desquamation of epithelium and a consequent blocking of the lumen, and a retention of the products of the gland, with a corresponding increase in the size of the organ. It will be seen that this theory, so far as the production of an increase in the organ is concerned, corresponds very closely to the theory which we have just considered. A septic infection of the genito-urinary tract is acquired before any enlargement can take place, and it compels the assumption that a large proportion of bladders and urethræ are infected at the age of 50 or thereabouts. This seems rather difficult of belief, but there is a certain amount of evidence which, if not conclusive, is certainly interesting. I may here briefly relate the results of some investigations which, in conjunction with Dr. L. S. Dudgeon, were undertaken to ascertain to what extent tumours removed during life from enlarged prostates were infected.

Seven specimens removed by prostatectomy were examined bacteriologically by Dr. Dudgeon.

Five specimens were infected with micro-organisms and two were sterile.

Of the five infected tumours, three gave a growth of staphylococcus albus and two a growth of bacillus coli communis. All these tumours were fibro-adenomata.

Two tumours were sterile ; one was a carcinoma and one a fibro-adenoma.

With the exception of the carcinomatous tumour, all showed signs of inflammation, as evidenced by the presence of areas of small round cell infiltration, and this was present even in the fibro-adenomatous tumour that was sterile.

This seems at first sight strong confirmatory evidence in favour of the inflammatory nature of the growths, but it must not be forgotten that this infection may have been secondary to, and engrafted on, the adenomatous change.

In every case the catheter had been used, but, in the cases of bacillus coli communis infection, it is not necessary to call upon this agent to explain the infection.

(9) This last theory simply states that the enlargement is due to a neoplasm of the nature of an adenoma, and leaves unsettled the cause of such growth. Its authors suggest that a chronic inflammation may be the exciting cause of the adenomatous change, but this is quite different to holding the enlargement to be directly due to an inflammation.

Before discussing these last three theories further, it will be helpful to rapidly summarise those appearances, which are found in enlarged prostates, and, with the exception of minor details, are admitted by all observers.

1. The changes do not occur before middle life.
2. The appearance in the normal spongy tissue of white opaque areas composed for the most part of gland tissue.
3. The growth of such areas, either single or in groups, to form, in a considerable number of cases, encapsuled tumours.
4. The preponderance in the stroma of such tumours of fibrous over muscular tissue.
5. The occurrence in various parts of the organ of areas of round-celled infiltration.
6. The appearance in the alveoli of desquamated epithelium cells, polymorpho-nuclear leucocytes and amyloid bodies.

We will now return to the consideration of theories (7) and (8), which account for the enlargement of the organ by the cystic dilatation of the gland spaces. If the increase in size is due to a glandular dilatation, it follows that, if an enlarged prostate is ten times as large as a normal gland, the lumen of the acini should be about ten times larger in the diseased than in a healthy gland, and that the stroma would only be

one-tenth in the enlarged gland compared with what it is in the normal. It also follows that the greater the increase the more will be the dilatation of the gland spaces, and that the texture of a microscopic section of a large tumour should be very much more open than that of a moderately enlarged organ. Now, it is not possible to say, from studying a number of microscopic sections, whether they come from a tumour weighing 30 grammes, or from one weighing 200 grammes (the weight of the normal prostate being about 20 grammes). Again, if one of the small enucleable tumours, which from the fact of its encapsulation must be considered to be a product of disease and to be increased in size, since its very capsulation on this theory is dependent on its increase above the normal, is submitted to a microscopic examination, it will in many instances be found to consist of gland tissue and stroma, in not very different proportions to those appertaining in the normal. It is true that the lumens of the glands are dilated in such a specimen, and that the stroma presents more fibrous tissue than the normal gland, but such differences are not incompatible with its being of an adenomatous nature. Differences of a very similar character exist between the adenomata of the breast and the breast itself. Supporters of the "infective" theory compare the processes which take place in a prostate with that which is seen in chronic interstitial mastitis. Up to a certain point these processes may be analogous. Both produce dilated gland spaces, both show signs of inflammation, and present desquamation of the epithelium. Here, however, the similarity ceases, for in the prostate enucleable tumours are usually formed, whereas these are never found in chronic interstitial mastitis.

The occurrence of adenomata of the breast, in an organ affected by chronic interstitial mastitis, suggests that a chronic inflammation may be the existing cause of the growth of the adenoma, and this would agree with Albarran's idea that a chronic inflammation may give rise to the adenomatous change in the prostate.

The reasons against the theories of the inflammatory nature of enlarged prostate seem to me too weighty to be dismissed, and I am inclined to agree with those who believe that it is really a new growth.

1. There are, I know, certain facts which tend to militate against the acceptance of this idea, namely :—

(1) The almost universal occurrence of areas of inflammation and of small-celled infiltration.

(2) The fact that in certain cases of enlargement no enucleable tumours are produced.

As regards the first objection, it is interesting to note that areas of small, round-celled infiltration are found in adenomata in other parts of the body.

With regard to the second objection, that no enucleable tumours are found in certain cases, it must be remembered that the encapsulation largely depends on the more rapid increase of one portion of the gland than of another, and that if the whole gland is uniformly increased, encapsulation may be absent ; and, again, it should be noted that there must be a period at the beginning of an adenomatous change before encapsulation can become established.

There is no doubt that the encapsulation of the tumours can easily be accounted for by this adenomatous theory, while it offers considerable difficulty under the inflammatory theories.

I may add that, of the cicatricial contraction spoken of by the supporters of the chronic inflammatory theory, I have seen practically nothing.

Taking all the facts into consideration, I am inclined to believe that the change in enlargement of the prostate is an adenomatous one, the exciting cause of which may be chronic inflammation.

CLINICAL SYMPTOMS.

While much has been said and written about prostatectomy and the nature of the operation now in vogue, very little time has been given to the discussion of what cases should be submitted to operation, and what cases can be treated by other means. In order to arrive at a right decision, it is necessary to determine what are the exact symptoms due to this disease. In the first place, a sharp division must be drawn between simple cases of prostatic enlargement and those which are complicated with septic troubles ; or, in other words, to distinguish between the symptoms of prostatic enlargement, and those of prostatic enlargement plus cystitis. The symptoms

of prostatic enlargement are as follows :—The patient, at first, perhaps without being aware of it, passes his urine at more frequent intervals. When he first becomes aware of this alteration in his daily routine, he takes but little notice of it, but as time goes on, he finds he has to arrange his day so as to be able to relieve the calls of nature at more frequent intervals, and any disregard of this precaution leads to pain and discomfort. He has to choose a lavatory compartment when taking a long railway journey, or, at any rate, to take care to start on his journey with an empty bladder, a precaution which a few years before was unnecessary. At other times, the first symptom noticed is a difficulty of initiating the act of micturition. Such a patient will often enter a public urinal, and before he can commence to empty his bladder, other younger and more fortunate individuals will have arrived, completed the act of micturition, and departed. To these troubles is very often added another, namely, inability to avoid instantly passing urine the moment the desire is felt. The flow also is liable to a sudden stoppage, and though the stream is as full as formerly, yet the act takes a longer time, and straining does not improve matters ; in fact, the patient has lost the power of properly projecting the urine. Often another unpleasant symptom occurs, namely, that of dribbling from the urethra after the act of micturition is apparently finished. About this period, the patient will have to rise from bed to empty his bladder. At first once in the night is sufficient, but in the course of time the necessity for rising becomes more and more frequent, and the patient suffers from loss of sleep. The last phase is the occurrence of an attack of retention, and, in a certain number of cases, the retention becomes permanent.

On the other hand, retention is occasionally the first symptom that attracts the patient's attention. Sometimes this retention will yield to treatment and spontaneous micturition be re-established. Unfortunately, the first attack may remain permanent.

Such is usually the train of symptoms, but it is not to be supposed that they are all met with in the same individual. Many patients never suffer from more than a little increase of frequency, and die without being really much incommoded by

their urinary troubles, while others are relieved by art, and with a little attention are able to live in comfort.

On the whole, it may be said that the symptoms caused by enlarged prostate are not very distressing, except in those who have the misfortune to suffer from an unrelieved retention. On the other hand, those in which the disease is complicated by cystitis suffer extreme pain and lead a horrible existence, and it is this class of case that is seen dragging out a wretched life and dying in an emaciated condition, worn out by pain and sepsis.

THE ALTERATIONS OF THE RELATION OF THE BLADDER TO THE PROSTATE WHEN THE LATTER HAS BECOME ENLARGED.

The Normal Arrangement.

The most external layer of the bladder muscle is formed by its longitudinal fibres which cross in a vertical antero-posterior direction over the summit. As they approach the prostate both in front and behind, they lose their vertical direction, and tend to become circular and horizontal. Traced down and on to the prostate they are seen to blend intimately with the organ. The internal circular fibres of the bladder, as they are traced down from the fundus, form, at the internal meatus, a very definite circular bundle to which the name of sphincter vesicæ has been applied. These fibres, again, can be traced into the stroma of the prostate, and in microscopic sections it is almost impossible to say at which point the bladder fibres end and the stroma commences. Inside these internal circular fibres on the posterior part of the neck of the bladder, we find an internal longitudinal layer which passes down from the openings of the ureters into the prostatic portion of the urethra, and is continued as far as the verumontanum. Internal to this layer, again, lies the sub-mucous strata, and embedded in this is a small venous plexus, which is possibly the source of the hæmorrhage in enlarged prostate. Covering this is the mucous lining of the bladder. It may be well to point out here that some observers do not believe that the sphincter of the bladder lies above the prostate, but maintain that the constrictor urethræ, surrounding the membranous urethra, is the true bladder sphincter.

The difficulty of accepting this view is the fact that the constrictor urethræ is a striated muscle, and therefore of a different nature to all other sphincter muscles.

The Arrangement pertaining when the Prostate becomes enlarged.

It will be seen from the above description that the prostate is an entirely extra-vesical organ, and that the internal meatus of the urethra is completely surrounded by a muscular ring. When the prostate begins to enlarge, in the generality of cases the enlargement takes place in an upward direction, and, if vertical sections are made through the neck of the bladder and the approximate part of the prostate, it will be seen that, as the organ enlarges, the glandular tissue comes to lie nearer and nearer the mucous membrane of the bladder. In other words, the prostate insinuates itself within the sphincter of the bladder, and, in process of time, the gland-tissue is found to lie immediately beneath the mucous membrane. The shape taken by the intra-vesical projection of the prostate varies very much in different cases. At one time it forms a low ring surrounding the internal meatus, the posterior part of this ring being almost invariably more marked than the anterior, and this is what would be expected when one remembers the normal disposition of the glandular part of the organ. If this form of enlargement becomes more marked, it will resemble the projection of the uterus into the vagina, the internal meatus corresponding to the external os and the projecting prostate to the intravaginal portion of the cervix.

If the prostate still further increases, it often forms a fairly acute though truncated cone, at the apex of which opens the urethra, which may thus come to be raised as much as 2 or 3 inches above the vesical floor.

At other times, one or other of the lateral masses undergoes a greater development than its fellow, with the result that the projection within the bladder is more marked on one side than on another. Again, in certain cases, the projection is very irregular, nodules appearing on this side or on that side without any regular arrangement and of a widely differing magnitude. The projection may first take place and remain localised to the part of the bladder immediately behind the urethra. It is to

this projection, though erroneously, that the term third lobe has been applied.

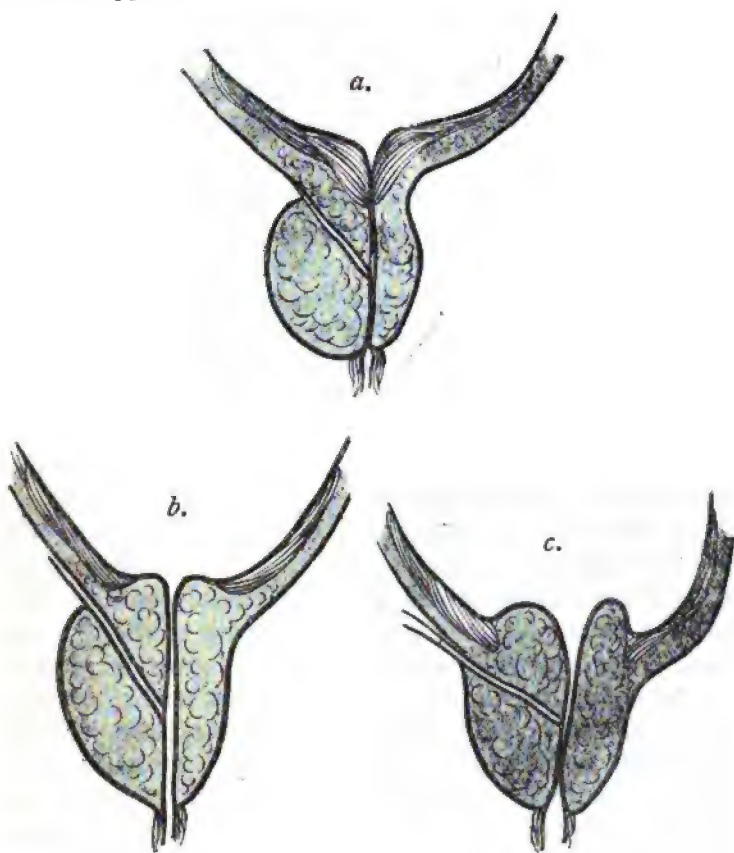


Fig. VII. *a.* The prostate is entirely extra-vesical. The internal meatus is completely surrounded by muscle fibre. *b.* The prostatic gland tissue has insinuated itself into the sphincter, so that the internal meatus is surrounded by prostatic instead of muscular tissue. Although the sphincter vesicæ is stretched, the floor of the bladder presents but little departure from the normal when viewed from the interior. *c.* The prostate has now formed a distinct intra-vesical projection, which may be compared to the projection of the uterus into the vagina. The sphincter is widely separated; the internal meatus is patent, and surrounded by gland tissue.

The form of the internal meatus undergoes, in addition, a marked change. Instead of a small dimple it is now very often

a funnel-shaped opening, this change being due to the growth within the sphincter of the gland tissue of the prostate. The effect on the bladder, as regards its capability of containing urine, must be well marked, since not only is there no muscle ring to close the internal meatus, but the entrance of urine into the urethra is actually encouraged by the patency of the prostatic opening.

ALTERATION IN THE URETHRA.

The urethra as seen in a cross section of a normal gland is crescent-shaped.

As the gland enlarges, it next becomes triradiate, the radii being placed one anteriorly and two laterally. The next change is the disappearance of the lateral radii, and the elongation of the anterior until the urethra is a simple slit. If both lobes develop at the same rate, the urethra on cross section will appear as a straight line, but if one lateral mass increases more quickly than that of the opposite side, the canal will become correspondingly curved. Not only is the prostatic urethra increased in measurement in an anterior posterior plane, as has just been shown, but it is also increased considerably in length, as measured along a catheter, owing to the increased vertical measurement of the enlarged and growing prostate. In nearly every case, the adenomatous masses tend to approach the urethral wall so that, after a short space of time, the wall of this canal becomes thinned, stretched, and attenuated. So thin and delicate indeed does it become, that it cannot, even by dissection, be raised for any considerable distance from the surface of the adenomata without rupture.

PHYSICAL BASIS OF THE SYMPTOMS OF ENLARGED PROSTATE.

Increased Frequency of Micturition.

The sphincter being no longer effective, the urine is extremely likely to gain access to the prostatic urethra. This likelihood will be increased when the opening into the bladder is funnel-shaped, as described above. The escape of urine into the prostatic urethra will at once set up a desire to empty the bladder, and the act of micturition will be almost involuntarily initiated. The occurrence of residual

urine (causation to be explained later) will aggravate the frequency of micturition, since the pressure in the bladder soon rises, owing to the continuous secretion of urine into an imperfectly emptied organ. When the bladder has once been emptied, a considerable time may elapse before the urine escapes into the prostatic urethra, and causes a desire for urination.

This seems to be the explanation of the fact that the passage of a catheter by a patient, accustomed to nocturnal micturition, will often give an undisturbed night's rest.

Retention.

The increased pressure due to the growth of adenomata, whereby the walls of the urethra are kept in apposition, will actually oppose the passage of urine, and a greater muscular effort on the part of the bladder will be necessary to expel the fluid. The unequal increase in the two lateral masses of the organ will also tend to prevent the onward passage of urine, since it is conceivable that the larger mass will be pressed down upon its smaller fellow, and thus tend to

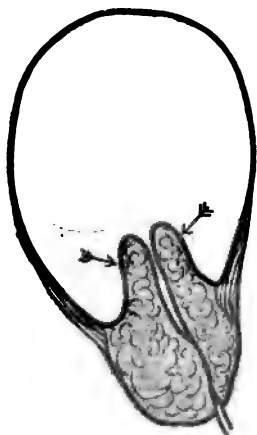


Fig. VIII. *Diagram to show the cone-like projection of the prostate. The internal meatus is more or less patent and unsurrounded by any muscle. The length of the intravesical projection renders the contained urethral canal liable to closure by the pressure of the urine communicated to the outside of the cone, when the bladder commences to contract.*

obliterate the urethral canal. In addition to this, the mere distortion of the urethra will impede the passage of urine through that portion of the canal. When the prostate projects into the bladder in the form of a cone, it can easily be seen that directly the bladder commences to contract, the increased pressure in the urine will exert its force on the sides of the cone, and thus tend to occlude that part of the urethral canal which lies within the projecting prostate. The occurrence of sudden retention, which may remain permanent, presents some difficulties of elucidation. The most common explanation is that the retention is brought about by a congestion of the mucous membrane. It is hard, I think, to accept this view *in toto*, since the mucous membrane that surrounds the internal meatus in such cases is almost invariably thinned and almost papyraceous, and thus in no condition to favour congestion. Another explanation is that the congestion of the tumour formation itself produces the obstruction, but even this will hardly account for those cases in which the retention remains permanent, nor are the tumours themselves vascular bodies in which congestion is likely to take place. On the other hand, there are certain facts which point to the possibility of these adenomatous tumours undergoing such a rapid shrinking as can only be explained by some such theory. In this connection, I may quote the following case:—

A. H., aged 69, was admitted for a vesical calculus and enlarged prostate. A suprapubic cystotomy was performed, the stones removed, and a suprapubic drainage established. It was noted at this operation that the prostate formed a conical projection into the bladder, the length of this projection being at least $1\frac{1}{4}$ inches. At the end of three weeks, the suprapubic opening was enlarged in order to perform prostatectomy. It was then found that the intravesical projection had undergone a great decrease, the projection not being more than $\frac{1}{4}$ of an inch above the bladder surface.

Frequent Micturition combined with sudden Stoppage of Urine.

This phenomenon may possibly be explained in the following way. The patency of the canal, admits urine into the prostatic urethra. An act of micturition is then set up and the bladder contracts. The moment the bladder commences to

contract, the forces which prevent the passage of urine onwards, as explained above, commenced to act. These forces are :—

- (1) Increased tension in the urethra ;
- (2) Pressure on the outer sides of the intra-vesical cone thus causing occlusion of the urethra ;
- (3) The forcing down of one unequal lobe against its smaller fellow.

*Dribbling from the Urethra after the Act of Micturition
has ceased.*

This is most probably caused by a want of the usual sequence in the contraction of the muscular constituents of the urethral canal, whereby the urine that has collected in the prostatic urethra fails to be swept out of the canal.

The interposition of the enlarged prostate between the bladder and the membranous urethra is apparently the cause of this failure.

Residual Urine.

The way in which this phenomenon is brought about is not altogether clear, and it is most probable that many factors are at work.

(1) The increased tension in the urethra by which stronger muscular contraction than normal is required to expel urine. When the bladder is distended, it is conceivable that it has sufficient power to overcome this resistance, but as the fibres shorten in their contraction, their power becomes less and less, until they are no longer able to expel the urine with the result that the bladder remains unemptied.

(2) Another factor is the deterioration in power due to constant overaction.

(3) A third factor may possibly be found in the following fact :—In the normal bladder the fibres arise from about the internal meatus, which for all intents and purposes is a point. When the prostate has grown into the bladder, the situation from which they act will no longer be a point, but a ring, corresponding to the outer surface of the intravesical projection. Such a state of affairs will cause a serious obstacle to the obliteration of the bladder cavity.

(4) Again, when the projection of the prostate is considerable, the summit will meet the middle of the superior surface

of the viscus before the lateral parts of the same surface can touch the floor. The projecting prostate can then be compared with a pole supporting the roof of a partially collapsed tent.

Inability to increase the Flow by Voluntary Effort.

This may be explained by the fluid pressure on the intra-vesical cone, or by the forcing down of one lateral mass upon its fellow, but it must be admitted that in some instances this explanation is insufficient.

Part played by the Bladder itself.

There can now be no doubt that the part played by the bladder wall itself, in the production of the symptoms due to enlarged prostate, is a secondary one, and that its loss of power is due to over-action, distension or inflammation (secondary cystitis). It is now a well-known fact that after prostatectomy in individuals, who have been dependent upon the catheter for years, and who have in addition suffered very frequent attacks of cystitis, the bladder completely regains its lost power.

TREATMENT.

Our present knowledge does not allow us to apply prophylactic treatment. The treatment, therefore, must either be palliative or operative. Palliative treatment consists in catheterization, and the observation of a few simple rules, combined with rest in bed. Operative treatment consists in castration, vasectomy, and prostatectomy in its various forms.

Catheter Treatment.

The catheter will first be required when the amount of residual urine becomes considerable, and this corresponds with the period when the patient is disturbed by nocturnal micturition. At first, catheterization is only required at bedtime, but it has soon to be practised in the morning, and later on in the middle of the day in order to avoid the frequent calls for micturition. If retention is established, whether it be late or early, the bladder must be emptied at least three times in the 24 hours, and one of these times will necessarily fall in the middle of the day. Putting aside those cases in which

the passage of an instrument is impossible, or causes excessive bleeding, there is no doubt that a large number of cases can be treated by the catheter. There is, however, a very definite and appreciable danger connected with the use of this instrument. First and foremost stands the danger of sepsis. It has been pointed out, earlier in this article, that the state of a patient with enlarged prostate and cystitis is pitiable in the extreme.

The question for and against the employment of the catheter depends upon how far the necessary cleanliness can be carried out. With educated people and those enjoying more or less leisure, this is possible to a certain degree. The patient who can appreciate the technique, can no doubt do what is needful at his own house, and sterilise his instrument in the approved fashion at night, in the morning, or, if at home, at midday.

When the passage of the catheter is required away from home great difficulties are introduced. Much ingenuity has been expended in devising means for supplying patients under these conditions with a sterile instrument, but, in spite of all this, it must be apparent to anyone thinking it out that the risks of infection are by no means slight. One has only to imagine an old man in response to an urgent call trying to pass an instrument in a railway-station lavatory.

Not only has the catheter to be clean, but the orifice of the meatus and the fingers must be clean too, since the latter must touch a part of the instrument that enters the urethra if it is of the soft variety.

If what has been said in the preceding paragraphs is true in the case of the well-to-do and well-educated patient, it is certainly all the more true when the patient is of a labouring class.

There are then very great difficulties in cleanly catheterization, and even if they can be efficiently carried out, they must entail a good deal of trouble and interfere very much with the daily routine of life, and even granted that they are carried out, it is probably only a matter of time before the infection takes place; even in a pathological laboratory with all skill and care, a certain number of experiments are spoiled by chance contamination.

Indications for Operation.

Perhaps it is yet too early to lay down any very dogmatic rules to guide us as to the time when operative treatment should be adopted. Operative treatment is needful under the following conditions :—

- (1) When the catheter cannot be passed ;
- (2) When its passage is accompanied by much pain or hæmorrhage, and I should advise it unhesitatingly ;
- (3) When there is complete retention.

When retention is not complete, the indications vary, I think, with the social state of the patient. When dealing with a patient of the labouring class, operation should be undertaken when catheter life has become established.

In the case of the well-to-do, educated man, who can pass his catheter at home, operation may be deferred. If, however, the patient is compelled to be away from home, I am inclined to advise operation fairly early. I think there can be no doubt that in future the operation of prostatectomy will be undertaken earlier and earlier, and if it is, the present bad cases of failing health, due to sepsis and loss of strength, will decrease, and with the decrease of such a condition will come, I am sure, a fall in the mortality of the operation.

OPERATIVE PROCEDURES.

Castration.

I have in a paper, read before the Pathological Society of London, shown that castration, although it will produce an atrophy of the normal organ, cannot be depended upon to do the same when the organ is pathologically enlarged. The mortality of castration has been shown to be little less than that of prostatectomy. The mortality up to 1900 for prostatectomy was 13 per cent., 25 per cent., or 20 per cent., according to different observers. The mortality of castration to the same date was 15 per cent. I think, therefore, that castration has been rightly abandoned.

Vasectomy.

In the same paper in which I dealt with castration, I proved that vasectomy could not be expected to cause an atrophy of the enlarged prostate. This operation was introduced under

the mistaken notion that section of the vasa deferentia produced an atrophy of the testis, and, through the atrophy of the testis an atrophy of the prostate. I showed experimentally in dogs that section of the vasa in the adult produced no change in the production of the spermatozoa in the testis (indeed this is a very old observation). In addition to this, I showed that the effect on the normal prostate was nil. I also quoted cases as showing that in the human subject, vasectomy did not cause an atrophy of the enlarged prostate. Vasectomy, therefore, must be abandoned as useless.

Prostatectomy.

The operation as now practised, the popularisation of which is due to Mr. Freyer, is, I believe, likely to replace all other operative proceedings. It is performed by the suprapubic route, the finger is introduced into the bladder, mucous membrane over the prominence of the tumour torn through, the finger is then insinuated into the thick "pathological capsule" and the adenomatous masses are enucleated, sometimes singly, sometimes bound together by a portion of this newly-formed "capsule," in which case the urethra is removed with the tumour.

I have already elsewhere stated my views as to the nature of this operation, and have expressed my belief that the success of the operation is explained by the fact that the expended outer part of the prostate is left behind in the form of a "capsule." This "capsule" may be only a thin but densely formed structure, and, to its presence we owe the absence of bleeding and of extravasation of urine, and later the avoidance of an impermeable stricture. It should be the aim of the operator to carefully preserve this surgical "capsule," and any laceration of it, whereby the recto-vesical fascia and the prostatic plexus of veins is exposed, is to be regarded as greatly increasing the operation risk. There can be no doubt, I think, that if the whole prostate is removed with its "pathological capsule" that an impermeable stricture will result.

TYPES OF TUMOUR REMOVED BY PROSTATECTOMY.

I will now show some drawings illustrating the different types of tumour removed by the modern operation, and I think that it

will be agreed that it is only on the supposition of an adenomatous enlargement of varying form within the expanded outer portion of the prostate, that the different appearances can be explained. I would here remind you that the gland tissue in the prostate forms a horseshoe-shaped mass behind and at the sides of the urethra, the horns of the horseshoe pointing forwards. Adenomatous masses can, therefore, develop in every or several parts of this area.

(1) *Simple Adenomata.*

Such a growth may develop, and may be removed from any part of the horseshoe glandular area, that is to say, it may come from the lateral mass or from the part behind the urethra. If it is small, it may be removed without lacerating the urethra, but this is improbable if the tumour be of any considerable size. The surface of such a tumour is usually smooth and lobulated, but it may show on its surface some circumferential running fibres, derived from that part of the prostate in which the tumour grew, and in which it became encapsuled (Fig. IX.).

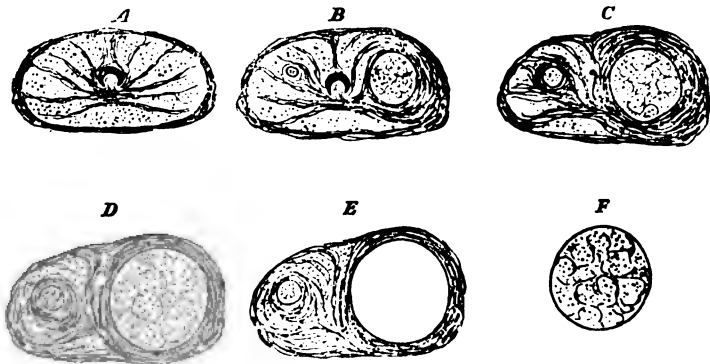


Fig. X. *Semi-diagrammatic scheme showing the development of the single adenoma, and its effect on the prostate. A. Normal gland. B. Commencing change in both lateral parts of the gland. C. Same as B, but more advanced, one adenoma has outgrown the other. D. Adenoma fully developed. The circumferential part of the gland has been expanded and compressed to form the "capsule." E. Shows condition of gland after removal of the adenoma. The cavity left by the removal of the adenoma lies entirely within the prostate; the prostatic plexus of veins is untouched,*

PLATE XIV.



Fig. IX.

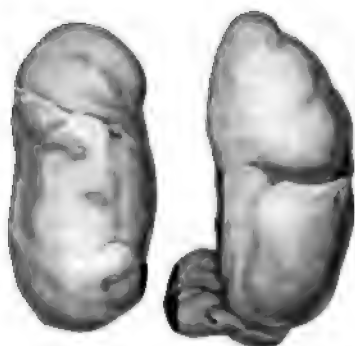


Fig. XI.



Fig. XII.

PLATE XV.



Fig. XIII.

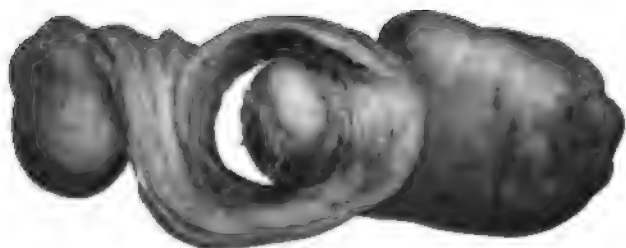


Fig. XIV.



Fig. XVI.



Fig. XVIII.

(2) *Twin Tumour Type.*

(a) *Without "Capsule."*—This type consists of two adenomatous masses, one from each lateral portion of the gland. They may be equal or unequal in size. Their surfaces may be smooth or presenting circumferential fibres, as in the last case. If the adenomata are large, the urethral wall will almost certainly be found lying on their opposed surface (Fig. XI.).

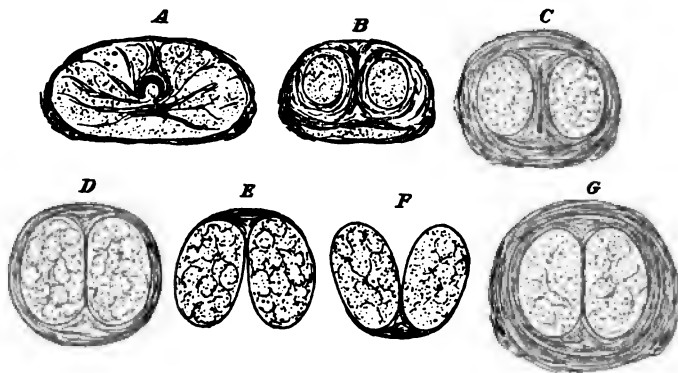


Fig. XV. Semi-diagrammatic scheme showing the formation of the twin tumour type. A. The normal gland. B. Adenomatous masses have formed one on each side of the urethra, which is already distorted. The portion of the gland outside the adenomata is showing signs of compression, as evidenced by the disappearance of the gland tissue and the concentric direction of the fibres. There is still a thick layer of tissue between the adenomata and the urethra. C. The adenomata have increased in size, and approached the urethra, which has now become a simple slit. The "capsule" has appeared, there being no appearance of gland tissue in the circumferential part of the organ. G. The adenomata are in apposition, being separated only by the attenuated urethral walls. The "capsule" is a thick, definite structure, on the outside of which can be seen the prostatic venous plexus. The dark line represents the point of cleavage in this capsule when such a tumour as D—twin tumour with complete capsule—is removed. E and F represent twin tumours with the capsule present in front or behind. Such tumours would be removed if the enucleating finger penetrated to surface of the adenomata, but left a portion of the "capsule" attached in front or behind.

(b) *With Partial "Capsule."*—This type again consists of two adenomatous masses, one from each lateral mass of the

gland, joined together either on their anterior or posterior surfaces by a bridge of circumferential running fibres (Fig. XII.).

(c) *With Complete Circumferential "Capsule."*—This consists of two adenomatous masses, one developed in each lateral mass of the organ, bound together by a well-marked band of expanded prostatic tissue, which completely encircles them about their equators (Fig. XIII.). The urethra in this type of specimen is removed with the tumour, and lies between the two tumours. The adenomata may be quite equal in size or unequal, very often markedly so (Fig. XIV.).

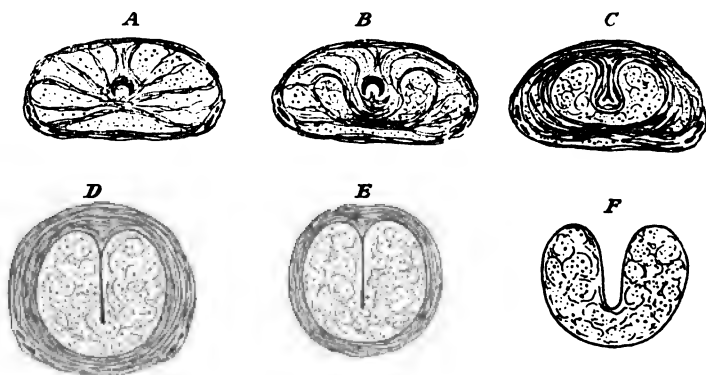


Fig. XVII. Semi-diagrammatic scheme showing formation of the horseshoe type of tumour. A. Normal gland. B. Commencing adenomatous change behind and at the sides of the urethra. C. Adenomatous change has advanced, and is now plainly visible. The urethra has been flattened from side to side. The gland tissue is disappearing from the peripheral portions of the tumour. D. Great increase in the size of the adenomatous mass. The urethra has become a linear slit, and the walls of the canal have disappeared. The outer portion of the gland has become a laminated "capsule." The prostatic venous plexus is seen to be on the outer side of this "capsule." The dark line indicates the line of cleavage taken by the enucleating finger of the operator when the tumour (E) is removed. In this case the horseshoe tumour is surrounded by a "capsule," which binds the two arms of the horseshoe together, and so keeps the urethral walls in apposition. F. Similar tumour removed without a "capsule." The adenomatous mass has opened out, so that the urethral walls are no longer in apposition, and the canal is ruptured along its anterior surface.

Horseshoe Type.

In this case the adenomatous change has progressed at the same rate throughout the gland tissue behind and at the sides of the urethra. The consequence is a horseshoe-shaped tumour, closed behind, but open in front. This type may be enclosed in a capsule like the last type, or may be devoid of such a structure as shown in Fig. XVI. The urethra is practically always found lying in the hollow of the horseshoe.

Ring Type. Fig. XVIII.

Here the adenomatous change has even invaded the anterior commissure, so that the urethra is completely surrounded by gland tissue. This type is nearly always surrounded by a

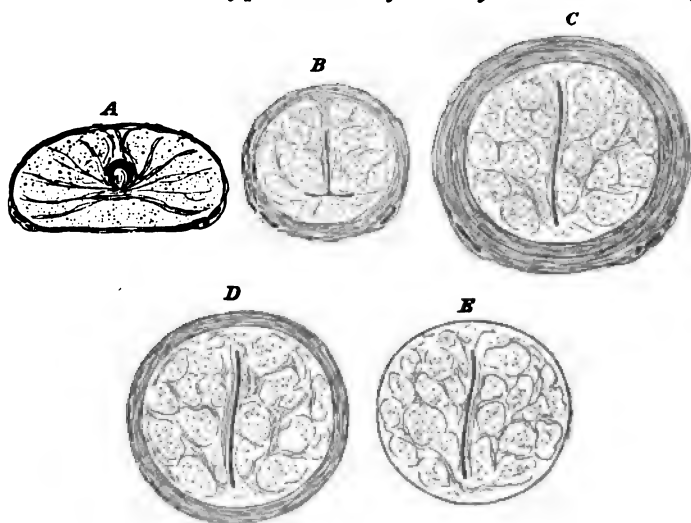


Fig. XIX. Semi-diagrammatic scheme showing the formation of the ring type of tumour. A. Normal prostate. B. Adenomatous formation has taken place on all sides of the urethra, which has become so distorted as to be triradiate on cross section. The outer portion of the gland shows no microscopic signs of gland tissue, and has become the laminated capsule. C. Shows the increase in size of the altered organ. The urethra is a simple slit. The dark line shows the line of cleavage used in the enucleation of (D), a ring type tumour with a well-marked capsule. E. A ring type tumour without capsule, which would have resulted if the enucleating finger had penetrated to the surface of the adenoma.

“capsule” of expanded prostatic tissue. This capsule may be a well-marked strong structure, or only represented by few circumjacent fibres. The urethra lies enclosed within a tumour.

I submit, therefore, that it is clear that the appearances of the tumours removed by prostatectomy are all reconcilable with the supposition that the operation consists of the enucleation of adenomatous masses from within the expanded peripheral portion of the gland, and that there is left behind a definite structure, composed of more than the outer non-glandular portion of the organ.

Prognosis as regards Ease of Operation.

I believe that it is not possible to tell from clinical examination if the enucleation will prove easy or not. It is only when the actual attempt is made that this can be ascertained. There are cases in which the tumours shell out with surprising ease. On the other hand, it is equally certain that there are cases in which the tumours can only be torn away piecemeal, although the enlargement is very marked. The reason for this is as follows, I believe :—

(1) Want of enucleation.

(2) Malignancy.

(1) The want of enucleation is most probably due to the adenomatous change progressing equally throughout the whole gland, so that no encapsulation takes place.

(2) As regards the question of malignancy, such tumours occasionally defy enucleation ; on the other hand, they occasionally shell out readily, and it is only by microscopical examination that the malignancy becomes apparent. On the whole, excessive hæmorrhage and a nodular surface point to the probability of a malignant growth.

THE ADVISABILITY OF PROSTATECTOMY—

(1) WITH REGARD TO ACUTE RETENTION,

(2) WITH REGARD TO EXHAUSTION BROUGHT ABOUT BY SEPSIS.

I am strongly of the opinion that, in acute retention, it is advisable to perform a suprapubic cystotomy, and to establish drainage of the bladder for some days before proceeding to enucleation of the tumours.

In chronic retention there is no need for this, provided the patient is in good condition, even when cystitis is present.

In cases of exhaustion due to sepsis, it is still more important that the patient be given time to recover his condition before prostatectomy is performed.

If prostatectomy is attempted in a patient worn out by sepsis and want of sleep, it will only end in disaster, and will naturally tend to discredit operative proceedings.

RESULTS OF PROSTATECTOMY.

The ultimate results of this operation are exceedingly gratifying; indeed, I know of no operation in which the change in the patient is more striking.

Instead of a feeble, miserable old man, with pain and suffering stamped on his features, and who often only looks forward to an early death as an escape from the miseries of his present condition, one sees a man, old indeed, but much less so than before the operation, who leads an active life takes an interest in the daily routine, and who looks forward to a considerable number of years of health and happiness.

In my series, reaching over five years, I have seen no untoward sequence, such as stricture or return of symptoms, so that I think the future can be looked forward to with equanimity if once the initial danger is passed.

My best thanks are due to Mr. Clutton and Mr. Reginald Harrison, who have allowed me to have drawings made of some tumours removed by them, and which seemed well fitted to illustrate several points in this paper.



INCISION OF THE TYMPANIC MEMBRANE.

By JAMES GALBRAITH CONNAL, M.B., F.F.P.S.G.,

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THE tympanic membrane may be incised in the following conditions:—

(1) In purulent middle ear disease (*a*) Before perforation of the tympanic membrane has taken place; (*b*) After perforation, to enlarge the aperture in the ruptured drumhead and establish better drainage;

(2) In exudative catarrh of the middle ear;

(3) In chronic adhesive catarrh of the middle ear—where other methods of treatment have failed—it has been found that in some cases, if one can establish a perforation in the tympanic membrane, the hearing is improved so long as the perforation remains patent. The difficulty, however, in such a case is to keep the perforation open;

(4) In chronic adhesive catarrh of the middle ear with atrophied portion of the membrane; where inflation of the middle ear improves the hearing temporarily, but where the atrophied portion is so flaccid that it soon falls in again, causing renewed dulness of hearing. In these cases of flaccid atrophied membrane, it has been proposed to make linear incisions in the atrophied area, so that when it heals by scar formation this will tighten up the atrophied portion;

(5) In the same type of case (chronic catarrh of the middle ear) with dulness of hearing and persistent and troublesome tinnitus, where the tympanic membrane is much indrawn and the posterior fold of the membrane is very prominent, it has been proposed, for the relief of the distressing tinnitus, to cut through the posterior fold by a linear incision; the idea being to restore to the tympanic membrane its proper curvature and tension. The idea is better in theory than in practice. Except in very rare cases, the membrane is not restored to its proper curvature, because, in addition to the indrawing of the

membrane with prominent posterior fold, there are adhesions in the tympanum binding the ossicles together, or the malleus to the promontory, or the tympanic membrane to the inner wall of the tympanum.

Regarding the three last-mentioned conditions, enough has been said to show that their range of usefulness is limited.

In the first two conditions, viz., in purulent middle ear disease, and in exudative catarrh, the importance and value of early and free incision of the tympanic membrane can hardly be emphasised too strongly.

In acute purulent inflammation of the middle ear before perforation of the tympanic membrane, the symptoms are pain in the ear, dulness of hearing, tinnitus, often giddiness with a marked but variable degree of pyrexia ; but the prominent symptom is pain in the ear. On examination, the walls of the external auditory canal will be found to be hyperæmic and swollen, the tympanic membrane markedly hyperæmic and bulging, so that the only landmark which may be visible is the short process of the malleus seen as a small white knob. Even this may be obscured, and the surface of the tympanic membrane may be covered with white epithelial scales. In such a case, the indication is to incise the tympanic membrane. If there is any doubt when to incise the tympanic membrane, let the question be decided by the three symptoms : (1) pain in the ear, (2) pyrexia, (3) bulging of the tympanic membrane. When these symptoms are present incise early and incise freely.

In infants too young to voice their complaints in language, the symptoms may be those suggestive of head mischief—feverishness, sickness, vomiting, restlessness, rolling of the head from side to side, with the hands often raised to the head—but with such symptoms an objective examination of the ears ought to be made, and if the tympanic membranes are found to be inflamed and bulging they ought to be freely incised. The prominence of head symptoms in children can be readily understood, when one remembers that along the roof of the middle ear in infants there runs the petro-squamosal suture (sometimes persisting ununited in later life), so that the dura mater and the mucous membrane may be in close contact.

Incision of the tympanic membrane is a simple and safe

operation, and the relief given is often remarkable. If the tympanic membrane is not incised, then one must wait till the pus forces its way through by rupturing the membrane. During this time the patient suffers severe pain, runs the risk of a purulent invasion of the labyrinth with loss of hearing or involvement of intracranial structures with grave risk to life; for it is well to remember that there may be intracranial complications before the tympanic membrane ruptures. All these dangers may be avoided or greatly lessened by an early incision of the tympanic membrane.

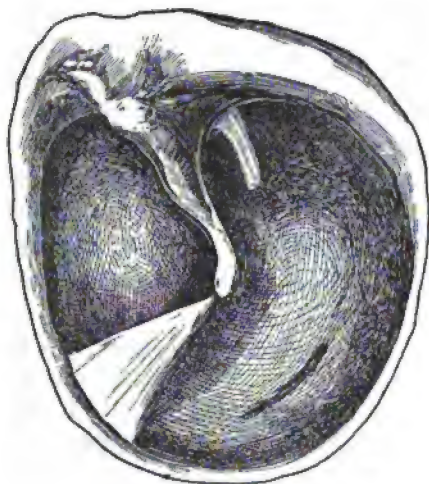
Incision of the tympanic membrane in children may be considered more difficult on account of the swelling of the auditory canal encroaching on the tube, diminishing its lumen, and giving the impression that the tympanic membrane is smaller in infants than in adult life. The contrary is the case. In infants at birth, the tympanic membrane is almost the same size as in the adult, despite the fact that other parts of the temporal bone are rudimentary—as, for instance, the absence of the mastoid cells and the rudimentary character of the osseous portion of the canal represented by the tympanic ring.

After rupture of the membrane there is generally cessation of pain. But if the pain persists an examination may show that this is due to the perforation in the membrane being small, what has been called a “nipple-shaped perforation.” This, with thick ropy discharge and defective drainage, may lead to persistence of pain, and may, if not remedied, involve the mastoid cells—acute mastoidal empyema. The indication is to enlarge the opening in the tympanic membrane and establish free drainage.

In exudative catarrh of the middle ear, where there is an effusion of mucous and serous fluid from the glands and vessels, and which is associated with some degree of obstruction of the Eustachian tube, pain is not a prominent symptom. The chief symptoms are dulness of hearing, feeling of fulness, crackling sounds, and autophonia. In the milder cases, inflation of the middle ear with Politzer's bag will give relief. In the severer cases, where the amount of the effusion is large, sometimes inflation has no effect, or only a temporary effect, and in cases where the improvement is so slow as to

need a long course of treatment, incision of the tympanic membrane is indicated.

The Operation.—The instruments and cotton mops should be rendered sterile. The canal cleansed with any warm antiseptic solution. A good plan is to use a 10 volume solution of peroxide of hydrogen, which has the advantage of loosening the desquamated epithelial scales over the tympanic membrane, then syringe with a saturated solution of boracic acid or carbolic solution (1-40) or bichloride solution. Have the ear under perfect illumination with the forehead mirror, and use the largest size of aural speculum which the auditory canal will admit. The point of election is the postero-inferior segment of the membrane, but any portion of the membrane may be incised, especially if it is bulging.



The tympanic membrane is divided into four segments by an imaginary vertical line, from the tip of the handle of the malleus down to the inferior margin of the membrane, and a line cutting this at right angles at the tip of the handle of the malleus. In the illustration, the tympanic membrane of the left ear is incised in the postero-inferior segment. The reasons for choosing the postero-inferior quadrant of the membrane are that, by doing so, drainage is good; there is no structure one can damage by the incision; this portion of the

membrane is far removed from the inner wall of tympanum; and, lastly, it is most easily got at. The second point of election is the antero-inferior segment of the membrane, but it is not nearly so good. If the incision is made in the postero-superior segment, it must be borne in mind that underneath there are the junction of the incus and stapes, the tendon of the stapedius muscle, and the chorda tympani nerve.

It is best in all cases to make a free incision and not a stab puncture. Some surgeons recommend that, in addition to dividing the membrane, the incision ought to be continued along the posterior wall of the external auditory canal, which, in acute purulent cases, is hyperæmic and swollen.

In young infants it is well to give a general anæsthetic, though this is not absolutely necessary.

After-Treatment in Purulent Inflammation of the Middle Ear.—After free incision of the tympanic membrane, carefully mop the secretion from the auditory canal with sterilised cotton-wool, and give the patient directions how to do this at home, emphasising the necessity for cleanliness of the hands, &c. If, after the lapse of forty-eight hours, the secretion is still very profuse, I generally direct the patient to employ antiseptic syringing, and thereafter to dry the canal of the ear with cotton mops, with satisfactory results. In these acute purulent cases I strongly urge the patient to remain in bed, if possible, for some days.

After-Treatment in Exudative Catarrh.—After incision of the tympanic membrane, inflation of the middle ear with Politzer's bag will throw out the secretion into the external auditory canal, where it can be mopped up with sterilised cotton-wool. A piece of gauze or cotton-wool can be worn in the ear till the membrane heals, and it generally does so in a few days.

The further treatment is inflation with Politzer's bag as may be required, and, what must be emphasised, removal of the cause, when the acute ear symptoms have subsided. This may be an acute or a chronic rhinitis, hypertrophied tonsils, or post-nasal adenoids.

HYDROCEPHALUS AND POSTERIOR BASIC MENINGITIS.

(PART OF A DISSERTATION FOR THE DEGREE OF M.D.
IN THE UNIVERSITY OF OXFORD.)

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(Concluded.)

B.—*Convulsions : Insanity.*

Convulsions.—In the following cases, the disease lasted 3 years, and 2 years, respectively. In the first case, however, there was a year's interval of perfect health.

Case 93.

- Age 2. Necrosis of the bones of the right orbit, after measles.
 „ 4. Headache followed by a series of general convulsions.
 An in-patient for one month. During the following
 year the boy was healthy and free from fits.
 „ 5. Fits began again. At first two to three months
 intervened between the successive fits, but their
 frequency gradually increased.
 „ 7. *On admission.*—“Well nourished. Head well shaped.
 Takes interest. Walks fairly well. No optic
 neuritis. No obvious paresis.”

After the second fit the skull was trephined. Three days later he died. The necropsy showed the usual condition in posterior basic meningitis of long standing: “Well-marked thickening of the pia arachnoid over the brain and spinal cord. Much adhesion between the medulla and the under surface of the cerebellum. Surface of the brain dry. Internal hydrocephalus.”

Case 30. For the details of this remarkable case I am indebted to Dr. Melville, who attended the child during the two years she survived, after leaving the hospital.

- Age 1 $\frac{2}{3}$. In hospital for two months with a severe attack of posterior basic meningitis during which there were no fits. She left much improved. “After leaving

the hospital, she improved very fast and took food well, very rapidly getting stout, chatting in her way, and pulling herself over the floor."

Age $1\frac{8}{12}$. She fell out of a perambulator. "No external injury was inflicted—but a fit of great severity ensued which lasted 16 hours; on its termination, absolute paralysis of right arm was present with complete loss of intelligence, and the development of a vicious and most destructive habit with depraved taste never spoke again." She lived two more years and had two to three fits every month, "tonic and clonic spasms followed by great drowsiness, lasting some hours Her fits increased in severity her nutrition was well maintained to the end."

Insanity.—Permanent insanity is an uncommon sequel. Case 30, just described, and Case 10 (who is now, ten years after his illness, a paralytic idiot, are the only two instances I find in my first group ("probably posterior basic meningitis"). The only other case described as "Idiocy following meningitis," is of doubtful nature.

Case 37.

Age $\frac{4}{12}$. Rash on the forehead succeeded by convulsions and slight fever.

„ $1\frac{6}{12}$. Said to have had convulsions every day since.

Head remarkable shape. Circumference $16\frac{1}{2}$ in.

Cannot sit or stand. No paralysis. Left internal squint. Discs natural. Blind. Movements spasmodic and purposeless.

c.—Paralysis: Retarded Development.

In the preceding group, an instance is mentioned of paralysis of one arm. But to this group belong certain cases in which there is more or less general loss of control over the body. The lesion is in the upper motor segment; the muscles keep in good condition. The general spasticity which is characteristic of the acute disease often endures for a long time in a minor degree in the lower limbs.

Case 54.

Age $\frac{6}{12}$. Admitted for posterior basic meningitis. After 2 months he was pronounced to be well.

Age $2\frac{1}{12}$. "He has not been off his bed ; his head is much larger. He has no use of his limbs, and has to be fed." His general condition was excellent.

Case 87.

Age $\frac{4}{12}$. Posterior basic meningitis. "In a stupor" for 6 weeks.

" $\frac{6}{12}$. Head began to enlarge.

" $\frac{9}{12}$. Obvious hydrocephalus, but head has stopped growing. Is almost blind. Still some general spasticity ; legs rigid. Healthy looking child.

" $1\frac{2}{12}$. "Has recovered his sight, but it is not very strong. His legs are less rigid ; there is no sign of standing ; he cannot even sit. Has gained flesh and is very knowing."

Case 91.

Age $1\frac{2}{12}$. Admitted for posterior basic meningitis. This is the only case in my series which developed definite optic neuritis. He was blind on admission, but the neuritis was not marked. "Lower margin of inner segment hidden, veins tortuous." The condition became rapidly more pronounced, and a week later there was "well-marked swelling of both discs with several hæmorrhages in the fundi."

I performed lumbar puncture 3 times, and took away more than 5 ounces of cerebro-spinal fluid ; from this the diplococci of the disease were cultivated. The boy remained an in-patient for 3 months and was sent out "improved." He took food by mouth after a long period of nasal feeding, and gained $\frac{3}{4}$ lb. in weight in the last 3 weeks. But his condition gave the poorest prospect of his ultimate recovery, as may be judged from the mother's letter. "When he came home his head nearly touched his feet, in fact he was nearly a ball. He was always in fits."

" $1\frac{6}{12}$. "For a month he has not had one. He can move his hands and arms as well as ever and his head—it is only his legs that are so stiff."

" $1\frac{11}{12}$. "My little one is getting on famous, he can talk in his way, and is sensible, and can move his limbs. All that is lacking is his eyesight."

Case 47.

Age $2\frac{4}{12}$. Mild attack of posterior basic meningitis.

- „ $4\frac{8}{12}$. "She walks a little stiff, but not so bad as she used to." Shortly after that I saw her, but observed nothing abnormal in her gait.

Retarded Development.

Usually after a severe attack it is some months before the patient can walk. It is often hard to say how far this defect is the weakness of convalescence, how far it is a part of a general cerebral deficiency, or how far it is directly associated with the spasticity of the legs which so commonly persists after other symptoms have passed off.

Associated with this retarded control of the body there is frequently a retarded development of the mental faculties.

Case 94.

Age $\frac{3}{12}$. Breast fed. Continuous vomiting and the head "hung back."

- „ 2. General condition began to improve.

- „ $7\frac{6}{12}$. Admitted for urinary symptoms. The girl had a large calculus in the bladder and abscesses in the kidneys. Goes on all fours. Has never been able to talk properly—can only say "Dada." Seems fairly intelligent—takes notice of everything. No fits. Legs spastic—ankle-clonus. Her head was "proportionately very large," but hydrocephalus was not suspected.

Post-mortem.—Convolutions very dry. Enormous internal hydrocephalus. On puncture of corpus callosum, 15 ounces of clear fluid escaped. Under surface of cerebellum bound down to medulla.

Case 100.

Age $\frac{3}{12}$. Posterior basic meningitis with hydrocephalus following immediately.

- „ $3\frac{7}{12}$. A healthy-looking boy with a hydrocephalic head. He was unable to sit up for 2 years, and cannot crawl or stand. The legs are not spastic, but the knee-jerks are brisk, and there is some ankle-clonus. He is quite sensible; he began to talk when 2.

Case II.

Age $1\frac{2}{12}$. Posterior basic meningitis in the hospital. After 4 months he was discharged.

„ $11\frac{2}{12}$. A well-grown boy, "not brilliant—but of quite average intelligence." Mother's account: "He had no sense when discharged home; couldn't hold anything; she was told at the hospital that he would be an imbecile and was offered a letter for a Home for Incurables. For about 2 months after he got home he was silly, then began to speak a few words, and after 3 months began to crawl."

Case 88.

Age $1\frac{1}{12}$. Posterior basic meningitis.

$1\frac{10}{12}$. Says words distinctly. Intelligent. Sits up imperfectly. Cannot stand.

$2\frac{2}{12}$. No attempt to walk.

„ $4\frac{2}{12}$. Can walk holding on with both hands. Pointed out some capital letters correctly.

Case 61.

Age $1\frac{1}{12}$. Posterior basic meningitis. In hospital till 7 months after onset. On leaving "blind; head retracted; legs rigidly extended."

„ $3\frac{6}{12}$. Fat, rosy, vivacious child. Can name many objects. Mother thinks "*just like a natural child of 2 years*" as regards intelligence. Knee-jerks excessive. No ankle clonus. Cannot walk alone; with support, tries to; tendency to walk on tip-toe.

Case 89.

Age $1\frac{1}{12}$. Posterior basic meningitis.

„ $1\frac{4}{12}$. Some use of limbs returned—chiefly of the right side.

„ $1\frac{9}{12}$. Began to walk.

„ $2\frac{2}{12}$. Left arm rigid—flexed at elbow, forearm pronated. The left leg is still dragged. Bright and healthy but fretful, and "constantly on the work." Always dribbling saliva.

D.—*Inability to gain Flesh, Headaches, Incontinence, Peculiarities of Temper, Morals, or Emotions.*

These minor ailments are constantly met with, and are, for the most part, independent of any gross disease. So that, at

first sight, it may seem absurd to see in them any evidence of internal hydrocephalus. Nevertheless, in the course of my investigation, I was struck by the unexpected recurrence of such complaints; and I had already begun to believe that this had some significance before I met with the famous illustration supplied by Hilton. The value of Hilton's description depends upon the unfailing spirit with which he insists upon the inclusion of every detail. But whilst the original account is readily obtained, it is important to have certain points that Hilton made, fresh in the memory, in order to do justice to the observations that follow.

A man, aged 34, vomited twice on the same day, and after the second occasion rapidly developed stertorous breathing and died. "The (cerebral) ventricles were greatly enlarged. The cerebro-spinal opening between the under surface of the cerebellum and the upper surface of the medulla oblongata was completely closed by a tolerably dense membranous structure, —the arachnoid in the neighbourhood at the base of the brain was somewhat opaque and thicker than natural."

After remarking that "this account has not been 'cooked' as it is termed," he proceeds, "this gentleman always had delicate health. As a child he was active and wiry, but very irascible in temper. As a man he was very spare and delicate-looking (all indications of a something which impeded healthy development). He had a fondness for intellectual pursuits—a great dislike to the excitement, and especially the noise of London. His food was always of the simplest kind. Even tea and coffee seemed to affect his head and derange his stomach. He could not bear a warm room, as it made him feel faint. Excitement frequently brought on an impediment in his speech. For many years he was subject to headache, derangement of the stomach, and occasional deafness. For the last years of his life he was gradually losing flesh. A few months before death he had a severe attack of vomiting with great prostration without any apparent cause. The last month or two were marked by a morbid activity and restlessness."

Case 11. The history has already been given.
Age 1 $\frac{1}{2}$. Posterior basic meningitis.

Age 11 $\frac{1}{2}$. The mother writes, "now, his only ailment is an occasional headache," which, he told me, was frontal, "and for which I find the best thing is to make him lie down and sleep it off." Head circumference 19 $\frac{1}{2}$ in.

Case 35.

Age 4. Posterior basic meningitis, moderately severe. In hospital till the end of the 7th week.

„ 8. A bright boy "only too forward with his books." Head circumference 20 in.

- (i) Complains of frontal headaches occasionally ;
- (ii) Very thin ; "he can't gain flesh, though he eats well."

Case 41.

Age 5. Posterior basic meningitis. In hospital over 2 months.

„ 8. Healthy looking boy. Head circumference 20 $\frac{1}{4}$ in. Mother complains that—

- (i) He has occasional slight frontal headaches ;
- (ii) He has a bad memory ;
- (iii) He masturbates (there was sufficient phimosis to account for this).

Case 55.

Age 3 $\frac{2}{3}$. Posterior basic meningitis, severe. Ill 9 weeks.

„ 5 $\frac{1}{4}$. Very healthy and intelligent. The complaints were :

- (i) "She keeps very thin in the body ;"
- (ii) Sometimes earache and slight deafness. (Large tonsils and adenoids.)

Case 100. Already described. Obvious hydrocephalus after posterior basic meningitis at the age of 3 months.

Age 3 $\frac{1}{2}$. "Very excitable. Nerves seem to be getting worse lately. Sleeps badly."

Case 19.

Age $\frac{2}{3}$. Illness accompanied with vomiting and hydrocephalus.

„ $\frac{1}{4}$. Out-patient, treated for 6 months with mercurial inunctions ; during the period head-circumference diminished from 20 $\frac{1}{4}$ in. to 19 $\frac{1}{2}$ in.

„ 10 $\frac{2}{3}$. In-patient. "During the last 9 years he has seemed quite well but his mental condition has seemed abnormal. He is fond of reading. Clean in his habits. Always irritable and perverse. Passionate.

Meddlesome. Restless. Seems very prone to take up anything he sees, *e.g.*, in a shop, though frequently warned against stealing. He has been lately getting deaf."

In hospital, the account said, "Head-circumference, 21 in. Head well shaped. Peculiar expression about eyes, sometimes deviating externally. Occasional slight nystagmus. Talks intelligently, but seems wilful, emotional, and childish for his age."

Case 60.

Age $3\frac{1}{2}$. Posterior basic meningitis, mild.

" $5\frac{1}{2}$. Apparently quite recovered, except that she is "very nervous; jumps if spoken to."

Case 43.

Dr. Bradley kindly sent me an interesting account of this boy's early history.

Age $\frac{6}{12}$. Screaming convulsions, and diarrhoea.

" $\frac{11}{12}$. Much fever (up to 104°) and diarrhoea. "The head-retraction was not very marked, but suggestive of posterior basic meningitis."

Age $2\frac{1}{2}$. "A regular 'fit,' *i.e.*, general convulsive contractions of all the muscles of the body, with *marked* head-retraction and strabismus, and followed by a spastic paraplegia. Unable to walk for months."

" $3\frac{1}{2}$. In-patient for 6 weeks. He had occasional slight pyrexia and a curious spastic gait. Diagnosis: " ? Sequelæ of posterior basic meningitis."

" $6\frac{6}{12}$. "A bright, intelligent, but extremely irritable boy." Head-circumference, $19\frac{1}{2}$ in.

Case 89.

Already described.

Age $\frac{11}{12}$. Posterior basic meningitis.

" $2\frac{3}{12}$. "Quite bright and healthy. Very fretful and constantly on the work."

These notes suggest that certain symptoms, which are nearly all comprehended in the syndrome of Hilton's case, are by no means rare sequelæ to an attack of posterior basic meningitis; and it is probable that the cause—internal hydrocephalus—is the same in many of them.

5.—THAT IN THE MAJORITY OF CASES OF HYDROCEPHALUS, ENLARGEMENT OF THE HEAD BEGINS AT THE AGE WHEN POSTERIOR BASIC MENINGITIS IS MOST COMMON ; THAT AT THE ONSET, THE PRESENCE OF POSTERIOR BASIC MENINGITIS CAN BE RECOGNISED IN EVERY GRADE OF SEVERITY, IN THOSE CASES, IN WHICH ALL THE CLASSICAL FEATURES OF THE MALADY ARE PRESENT, AS IN THOSE IN WHICH ONLY ONE SYMPTOM IS PRESENT ; AND THAT BEYOND THESE LATTER ARE CERTAIN CASES WHICH BEGIN AT THE SAME PERIOD OF LIFE IN WHICH NO SYMPTOMS ARE RECORDED AT THE TIME OF ONSET.

Amongst 42 cases of hydrocephalus, whose histories I have obtained, 8 gave a history of posterior basic meningitis sufficiently complete to be beyond doubt ; 3 of these (Cases 93, 100, 102) are already described ; 2 others (Cases 87, 94) will be quoted later. The 3 that remain are as follows :—

Case 6.

Age $\frac{2}{12}$. A fortnight after a fall "the head became stiff." This was followed by convulsions. Four months later "head thrown back and general rigidity ; head large." During the next 3 months, the head circumference increased from $20\frac{1}{2}$ inches to 22 inches.

Case 58.

Age $\frac{3}{12}$. Convulsions, head-retraction, continuous vomiting ; the symptoms lasted 5 weeks. During the next 3 weeks, her condition improved, but at the same time her head enlarged. In hospital the child underwent 5 operations with the object of establishing sub-dural drainage. After a temporary improvement she died, and the necropsy revealed "matted membranes closing the foramen of Majendie."

Case 68.

Age $\frac{2}{12}$. Head-retraction, squint, vomiting, blindness. The symptoms subsided but the head enlarged.

Age $\frac{8}{12}$. A silver tube was introduced into one lateral ventricle ; the boy went home.

" $\frac{10}{12}$. Head continued to enlarge. A second operation proved fatal.

Whilst these cases gave a complete history of the disease, in 6 others nothing was recollected of the onset of the hydro-

cephalus beyond the enlargement of the head. Between these two extreme classes, there are 16 cases where one or more symptoms of posterior basic meningitis were recorded. It is the fact that amongst these, one can trace every grade of severity of the disease, which makes it probable that even the mildest cases are correctly assigned to this category.

These 16 cases I proceed to record with great brevity.

Case 107. A neglected child.

- Age $1\frac{6}{12}$. Fits for one month. During the next 18 months one arm gradually became drawn up.
- „ 3. Head retracted, spine arched, legs extended.
Post-mortem.—Internal hydrocephalus. “The two frontal lobes looked like bags distended with fluid.” Lymph on the meninges.

Case 40.

- Age $\frac{8}{12}$. Twelve fits a day with general rigidity. The head “fell back” and child began to vomit. After the first week the head began to enlarge.
- „ $\frac{14}{12}$. Blind. Removed at suggestion of operation.
- „ 3. Child’s head is much larger.

Case 101.

- Age $\frac{4}{12}$. Twitching one hand. Vomiting and bronchitis.
Doctor said : “Consumption of brain.”
- „ $\frac{8}{12}$. Head began to enlarge.
- „ $1\frac{8}{12}$. Head enlargement had ceased for 3 months.

Case 112.

- Age $\frac{8}{12}$. “Inflammation of the brain.” Doctor put leeches on the temples.
- „ $\frac{6}{12}$. Head began to enlarge.

Case 38.

- Age $1\frac{11}{12}$. Fit and ? scarlet fever. Unconscious, on and off, for 11 weeks ; then some improvement, with fits, vomiting and blindness.
- „ $2\frac{2}{12}$. Admitted for hydrocephalus and pseudoglioma.
Died shortly after from measles.

Case 14.

- Age $\frac{4}{12}$. Convulsions.
- „ $\frac{6}{12}$. Head enlarged.
- „ $\frac{8}{12}$. Admitted. Blind. “Only lived a few days.”

Case 9.

- Age $\frac{4}{12}$. Convulsions followed by blindness.

Age $\frac{1}{12}$. Head began to enlarge.

„ $1\frac{2}{12}$. Admitted for hydrocephalus. "Died a few months later from the same disease."

Case 109.

Age $\frac{2}{12}$. "Taken ill, with fits of screaming, for about one month, and then head began to enlarge."

„ $7\frac{2}{12}$. Admitted for chronic hydrocephalus.

Case 27.

Age $\frac{1}{12}$. An illness with head-retraction. Hydrocephalus followed.

Case 113.

Age $\frac{2}{12}$. "Taken with fever and vomiting, and then head began to enlarge."

„ $2\frac{1}{12}$. Admitted for hydrocephalus.

Case 115.

Age $\frac{1}{12}$. Chicken-pox, diphtheria, and convulsive fits. "Head began to enlarge immediately afterwards."

„ 2. Admitted for hydrocephalus.

Case 106.

Age $\frac{1}{12}$. Became "poorly."

„ $\frac{1}{12}$. Convulsions, blindness (amaurosis lasted 2 years).

„ $\frac{1}{12}$. Head began to enlarge.

„ 4. Admitted for hydrocephalus.

Case 19.

Age $\frac{2}{12}$. Enlargement of the head with vomiting.

The head-circumference became reduced, *i.e.*, "concealed hydrocephalus."

Case 70.

Age $\frac{2}{12}$. Convulsions. Then the head began to enlarge.

„ $3\frac{2}{12}$. Admitted for hydrocephalus.

Case 13.

Age $\frac{2}{12}$. Ill with fever. Then the head began to enlarge.

„ $2\frac{1}{12}$. Admitted for hydrocephalus. Died from pneumonia.

Case 114.

Age $\frac{1}{12}$. Measles. During the next 10 months the child steadily lost flesh.

„ $2\frac{1}{12}$. Head began to enlarge. Admitted for hydrocephalus.

Those, who hold that I have over-estimated the importance of posterior basic meningitis as a factor in the causation of hydrocephalus, will point out that the above are selected cases. In a subject of this nature, I think statistics are of little value

but, in order to obtain an unbiassed view, I took notes of all the cases of hydrocephalus which were in-patients under the charge of one physician. There are 13; 7 of them (cases 106, 107, 109, 112, 113, 114, 115) are described above; in 4, no symptoms associated with the onset were recorded (head noticed to enlarge at 3 months, 6 weeks, 3 weeks, and 3 months respectively); in one, tubercles were found in the brain; the necropsy revealed in the last case a cerebellar tumour.

I will conclude by quoting a summary at the end of an article, on internal hydrocephalus in the adult by Parkes Weber.

"1. The various kinds of hydrocephalus may be compared with the various kinds of effusion into the pleura and peritoneum.

"2. The cases of so-called idiopathic, or simple internal hydrocephalus, are probably nearly all due to more or less localised serous meningeal or ependymal inflammation.

"3. That the reason why chronic inflammatory thickening of the roof of the fourth ventricle has so often been found present in fatal cases of chronic hydrocephalus is, that—this is one of the sites of election for the localised inflammation which leads to hydrocephalus.

"4. That the theory of a purely angio-neurotic effusion to account for some cases of acute internal hydrocephalus has, as yet, not sufficient evidence to support it.

"5. That many of the cases of apparently acute hydrocephalus in adults and older children are really exacerbations of a chronic condition."

These assertions gain support from the evidence here adduced of the important rôle, which posterior basic meningitis plays in the causation of hydrocephalus.

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ANO-RECTAL ULCERATION.¹

By FREDERICK C. WALLIS, M.B. (CAMP.), F.R.C.S.,

Surgeon, Charing Cross Hospital.

ANO-RECTAL ulceration is a term which I have thought best to apply to a condition, which I have constantly found in the lining membrane of that part of the bowel, which lies between the anus and the internal sphincter.

This lesion is a pathological condition, which is the initial pathological cause of many of the ordinary rectal ailments. It is the cause of genuine pruritus ani—as I have demonstrated at various times. It is the cause of fissure in ano. It is the cause of all ischio-rectal, pelvi-rectal, sub-mucous, and sub-tegumentary abscesses, and, as a natural sequence, it is the cause of all fistulæ, which are, so to speak, the residue of these abscesses. All tuberculous fistulæ, and those extensive ulcerations which proceed from them, are due to the same cause.

Finally, this pathological lesion is the cause of many of those distressing cases of infective ulceration of the rectum, which are, I think, almost unparalleled in the pain and misery they cause, and in the intractable position they present to nearly all forms of treatment, a condition which has been and still constantly is wrongfully put down to syphilis.

Now that I have told you this, you will no doubt, and not unreasonably, think that I have said a great deal on a common class of ailments which has never been said before, and which you do not propose to accept without very substantial proof. I propose to show you on the screen a series of diagrams explaining my statement, and you must verify them, and it can easily be done, in your patients. And if my diagrams will convince you that there is something in what my experience has found in many hundreds of cases, the advantage to yourselves and your patients will, I think, be fairly obvious.

¹ Lecture given at St. Leonards' Medical Society.

In the first place, it is necessary to realise in what a small space all these troubles originate, and to illustrate that I have a diagram showing the proctodeum, and the rectum with a septum between.

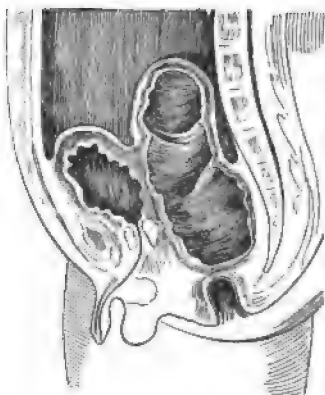


Fig. 1.

For all practical purposes, it may be said that it is in the lining membrane of the proctodeum that the lesions occur, which are primarily responsible for those diseases of the rectum already mentioned. This lining membrane is not skin,

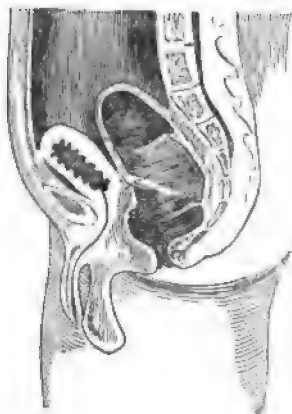


Fig. 2.

and it is not mucous membrane, and consequently it has not the tough, resisting power of the one, nor the vascular supply, which is a great power, in the other.

Any lesion then occurring in this area has a small chance of recovery, because (1) of the scanty blood supply, (2) of the constantly altering dimensions, and (3) because of the contents of the intestines which are constantly passing over it.

Fig. 2 shows a normal rectum, where the fusion between the proctodeum and bowel has taken place, and again emphasises the small space in which these lesions occur.

The two sphincter muscles are separated by a space of about $\frac{1}{4}$ inch, but there are some longitudinal fibres of the rectum which pass across this space and penetrate the external sphincter.

Fig. 3 shows the area in question more in detail, and what are known as the crypts and columns of Morgagni are well

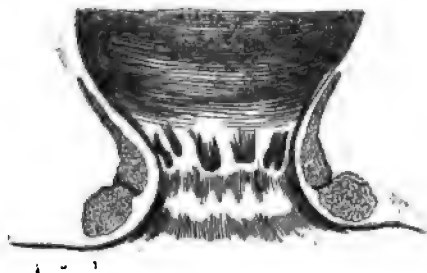


Fig. 3.

seen. These are produced at the line of junction of the gut with the proctodeum, and these crypts in particular, when, as

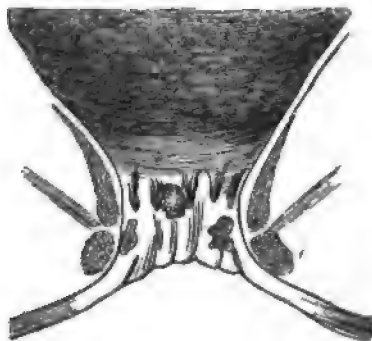


Fig. 4.

occasionally occurs, they form little cul-de-sacs, are the cause of a great deal of suffering if injured and torn down.

Fig. 4 shows the position in which these abrasions may

occur, but although they not unfrequently occur at two or three different places, the commonest situation is just to one side or the other of the dorsal mid-line as shown in Fig. 5.

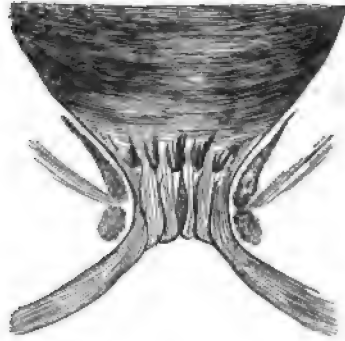


Fig. 5.

These abrasions become covered with granulation tissue, and are practically chronic ulcers, which exude an irritating secretion causing pruritus ani.

As my experience of this troublesome complaint has quite recently been published (*Brit. Med. Journ.*, May 13, 1905), I need not trouble you by repeating it, but I should like to show you Fig. 6, a diagram of the condition of the skin around

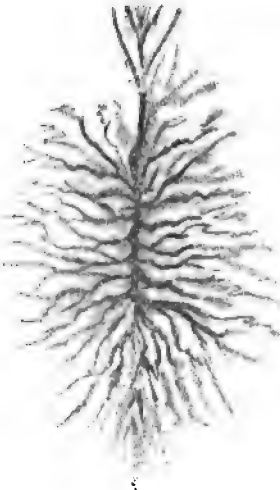


Fig. 6.

the anus, which is the typical appearance in cases of chronic pruritus ani, and which when present is, in my experience, invariably associated with the lesion of the lining membrane shown in the last diagram.

This lesion, as has been said, occurs usually in the posterior segment near the mid-line, and although as a rule the condition may exist for a long time, it is difficult to say how long without the owner being directly aware of it, yet if from any cause the affected area becomes inflamed, and the adjacent muscles with their (liberal) nerve supply become involved, then all the well-known symptoms of fissure in ano occur. This is shown in Figs. 5 and 7, but the external appearance shown in Fig. 7 has been purposely somewhat exaggerated.

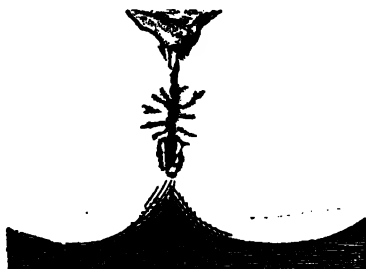


Fig. 7.

The symptoms of fissure in ano may be slight, severe, or anything between them. The nearer the skin the fissure comes, the more acute is the pain, and even this is increased when the muscle beneath is inflamed. The treatment of a definite fissure in ano is well known, and need not take up our time in discussing it, but when a patient complains of a burning pain, which commences shortly after the bowels have acted, and lasts for an appreciable period at times, it will be found on examination that some such condition as is shown in Fig. 5 exists, and if this is treated with the electric thermo-cautery, or the application of lactic acid, the symptoms disappear.

Abscesses.—There are four recognised forms of abscess in this region, which I wish to consider first, viz.:—(1) Sub-tegumentary; (2) Sub-mucous; (3) Ischio-rectal; (4) Pelvi-rectal. In all these cases it can be demonstrated that an

opening, of greater or lesser dimensions, exists in the space under discussion, *i.e.*, between the sphincters.

Fig. 8 shows in diagram the situation of the various abscesses.

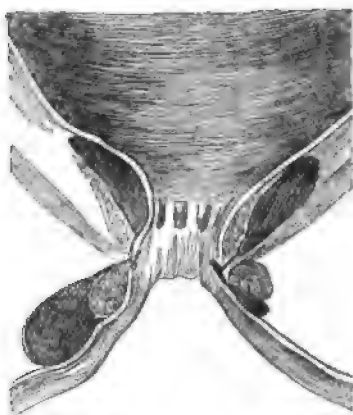


Fig. 8.

The sub-tegumentary lies under the skin, superficial to the external sphincter.

The sub-mucous is between the mucous membrane and the internal sphincter, around the upper margin of which this variety often tracks.

The ischio-rectal abscess passes out between the sphincters, fills up the ischio-rectal fossa, and becomes prominent beyond the external sphincter.

The pelvi-rectal—the most serious of all—is situated between the levator ani and the internal sphincter muscles, and because of its position may cause considerable damage before it is recognised.

Figs. 9, 10, 11 show the most important of these abscesses from different sections made of the pelvis.

It will be noticed that preference has been given to the posterior segment for their commencement, and this is well known to be borne out in fact.

All these abscesses may be bilateral, and the cause of this will be discussed when fistulæ are dealt with.

There is much to say, and time is limited, so I must be

dogmatic, and be content to give you the results of my experience, leaving argument for later on.

These abscesses originate from an infection of a chronic ulcer, such as I showed you in Fig. 4, and the form of abscess depends upon the track the infection proceeds along.

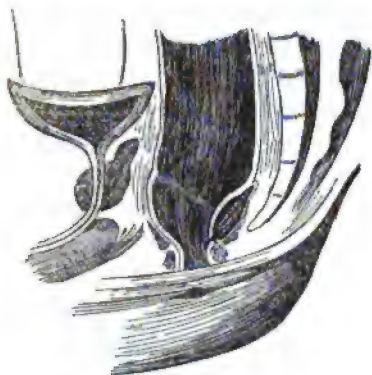


Fig. 9.

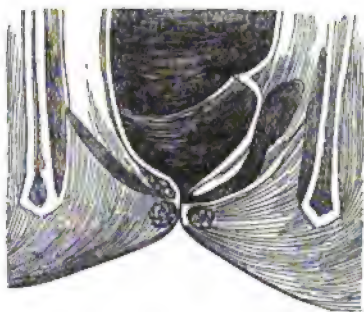


Fig. 10.



Fig. 11.

The easiest proof of this is seen in the sub-tegumentary or sub-mucous abscess. Here, when pressure is made on the swelling, pus will be seen to exude from the infected ulcerated starting point, and in the case of a sub-mucous abscess a probe can be passed up into the cavity.

In the sub-tegumentary cavity, if an incision is made through the skin, a probe can be passed straight in and up through the internal opening into the bowel.

The same thing can be demonstrated, but not so easily, in the other forms, showing without a doubt the origin of these abscesses.

Treatment.—The majority of these abscesses end in fistulæ, but a small proportion get well when the abscess cavity is opened and properly drained.

The sub-tegumentary abscess is freely opened and granulates up.

The ischio-rectal abscess is opened outside the sphincter, and any pockets are broken down by the finger, so that there is one common cavity, which is drained by a tube through a free skin incision, but the external sphincter is *not* divided.

In the sub-mucous variety the treatment differs somewhat, and is a matter of some importance.

If, as is ordinarily done, the abscess is laid open by incising the superjacent membrane, a protracted convalescence ends in an unsatisfactory result.

Owing to the contraction of the sphincters the drainage is not efficient, and, when the abscess has healed, there will be marked prolapse of the mucous membrane.

The best way to treat a sub-mucous abscess is to dilate the opening and then pass a hooked director through the opening, and pull until the end can be felt through the skin, incise the skin over this, and pass a straight director through to the internal opening, and divide everything lying above the director. By this the external sphincter is divided, the abscess cavity can be thoroughly explored and treated, and this I consider of great importance, *without* materially damaging the mucous membrane, and the best drainage is obtained.

The same method should be adopted, in the pelvi-rectal abscess (Fig. 10). In both these the incision should divide the external sphincter, and as free an opening *outside* this as is thought necessary may be made, but the internal sphincter and levator ani muscles and mucous membrane must not be interfered with.

If this plan is adopted, and a complete exploration is made of the cavity with the finger, the pus can be evacuated and the cavity thoroughly irrigated, packed, and drained. The packing is removed after 48 to 60 hours, and lightly repacked. The cavity is syringed every day with peroxide of hydrogen—the best lotion possible for these foul abscesses—and the patient is greatly benefited by a warm boracic bath every day.

If treated on these lines, these abscesses will do extremely well, and many will heal up, and not end in fistulæ.

Fistulæ.—When an abscess has formed, the tension of the accumulated pus finds relief by (a) draining out through the original track, (b) opening back up into the bowel when sub-mucous or pelvi-rectal, or (c) bursting through the skin when ischio-rectal or sub-tegmentary.

In any case when the tension has been relieved a suppurating track is gradually formed, and a fistula is the result.

The diagrams 12, 13, 14, show the varieties of fistulæ, and it will be seen that those shown in 12 and 13 are in the same positions as the abscesses shown in Fig. 8.

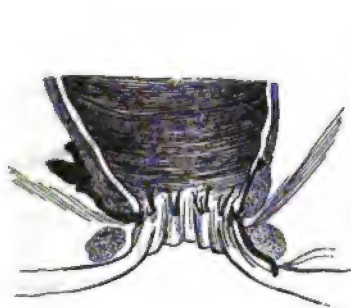


Fig. 12.

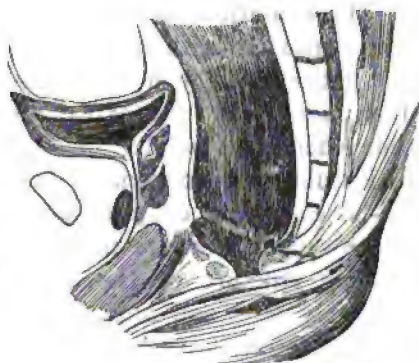


Fig. 13.

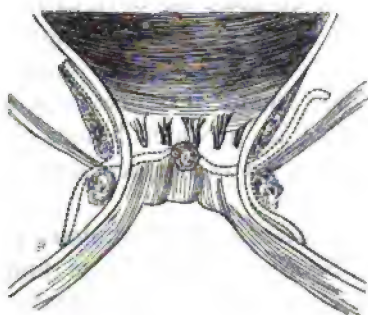


Fig. 14.

The method of formation of a bilateral abscess, with its resulting horseshoe fistula, is shown in Fig. 14. The indurated

external track of these fistulæ can be felt through the skin by the finger, and their outlines are shown in Fig. 15.

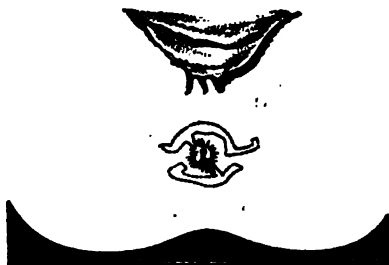


Fig. 15.

The causation, course and varieties of fistulæ have hitherto been shrouded with some semi-mysterious ideas, but, if it has not wearied you to follow my statements, you will, I think, agree that the explanation given is simple, practical, and, when once pointed out, obvious.

Fistulæ are occasionally caused by foreign bodies, such as fish-bones, or by external wounds, by abscess due to caries of the sacrum, and are not unfrequently associated with long standing stricture of the rectum. These causes are comparatively rare, and must be specially dealt with, but cannot be considered in this paper, which deals with the common source of these various rectal ailments already mentioned.

Tuberculous fistulæ originate from the same pathological lesion. That this is so must be obvious in view of what has already been said. Intact mucous membrane and skin form a most efficient coat of mail against infection from without and within, but how many instances will at once come to the minds of each of us, in which lesions of skin and mucous membrane have been the commencement of infections of a most serious character.

The intestinal contents of tuberculous patients are full of tubercle bacilli. Sooner or later these find the weak spots in the armour and commence work. It is work of a slow character and painless to the patient, so much so that when first attention is drawn to the condition, it is found that extensive destruction has already occurred.

This, on careful examination, shows in an exaggerated form

the same original site as those fistulæ already mentioned not tuberculous in character.

Treatment.—There is not much to be said which is new in the way of treatment of fistulæ. But I would ask you not to be led away by the glowing accounts of the healing of fistulæ by cutting out the fistulous track, and sewing up the gap hoping for primary union. It is, of course, right to hope for it, but do not build upon it. The few cases, in which such treatment can reasonably be expected to be successful, are those in which, in any case, a cure by the ordinary method will usually occur in the same time, without running any risks of reinfection, which must always be regarded as more than a possibility, when the infected sinus is cut out and the resulting gap sewn up.

In long pelvi-rectal or sub-mucous tracks, with or without a *secondary* opening above the internal sphincter, do not ever be induced to lay open the whole track into the bowel.

It is in my opinion absolutely bad surgery, and the results may be appalling. A long convalescence with a stricture, and possibly fæcal incontinence at the end of it, may be the result. In such a case, be content to divide the external sphincter at the site of the original abrasion, and make the *external* incisions free as you like, but the cavity or track that lies above this is cleared out and lightly packed, and kept as clean as possible by suitable daily irrigations. I have never yet failed to cure a case by these means, although sometimes months may elapse before that condition is arrived at.

Good results in rectal surgery depend largely upon the personal attention of the operator, and this particularly applies in cases of fistulæ.

In long standing cases, there is a tendency for a wound to break down in the deeper part, whilst the superficial portion heals over. This is known as "bridging," and results in a return to the original condition of fistula, and the wound has to be opened up again.

To avoid this, careful examination must be made with the finger and a stout probe, to see whether there is any such breaking down, and if this is found to be the case, a solution of eucaine is applied over the area for two minutes, and then the defective granulation tissue is scraped away with a spoon,

and the cavity thus formed is firmly packed with gauze. If the bridging is only slight in character, the superficial granulations can be broken through with a probe, and the resulting cavity packed.

These are a few points in the treatment of fistulæ to which I have thought it well to draw your attention.

Infective Proctitis.—The last condition that I wish to speak about is infective proctitis, a condition, as I have said, so appalling in its results that I do not know anything to equal it in the chronic misery and suffering it produces.

The subject is much too large to enter upon at the end of a paper, but I have already published my experience of this disease in a paper published in the *British Medical Journal*, October 6, 1900, entitled "The Cause and Treatment of Non-malignant Stricture of the Rectum."

Infective proctitis is more common in women than in men, infection from a vaginal discharge being no doubt the cause of this. But, from whatever source the infection comes, the results in a typical case are as follows:—

On inspection, the skin at the muco-cutaneous junction is swollen and inflamed, but not as a rule ulcerated. On digital examination the mucous membrane is found to be ulcerated in places, and, where not ulcerated, it is thickened by sub-mucous infiltration. This sub-mucous infiltration gradually extends up the bowel unequally, and usually encircles it. There is a discharge of blood-stained pus, salmon-pink in colour, in all these cases, which is typical.

I want very much to impress you with the character of this discharge. It is one which should always be recognised as pathognomonic of infective ulcerative proctitis.

The patients suffer considerable pain when the bowels act, and when being examined. There is a sense of weight, throbbing, and discomfort constantly present in the rectum. The disease is generally associated with a febrile condition, and yet the personal appearance of many of these patients is one which is associated with perfect health.

This ulcerative condition, when not due to post-operative sepsis, or the result of pressure in a protracted labour causing sloughing of the rectal mucous membrane, is caused by infection through one of the abrasions already mentioned.

What particular micro-organism produces it I am unable to say, as, in spite of repeated attempts, I have not yet been able to isolate any micro-organism, apart from those usually found in this part of the body.

The further history of these cases is that, after some time—years in some instances—the condition of the tissues where the ulceration began is so altered that the circumference of the bowel is composed of fibrous tissue, whilst above this the ulceration slowly proceeds.

The fibrous tissue gradually contracts, causing a stricture which allows only a partial emptying of the intestine, the contents of which slowly accumulate, causing distension of the large bowel, and producing a typically distended abdomen. The general health suffers considerably, and, after some years of distress, although the acute symptoms of obstruction may be relieved by colotomy, the patients die miserably.

The best treatment for these cases has yet to be discovered, and the first step towards it is *early* recognition of the disease.

Do not believe that these cases are due to syphilis. It is commonly said to be so in all text-books, as well as in most books written on diseases of the rectum, but I most emphatically assert that such is not the fact.

In all the cases I have seen, and these are now quite a large number, there is not a single instance in which it could be stated that syphilis had anything to do with the condition. Moreover, during the years I have been at St. Mark's Hospital, among the many thousands of cases that I have examined, I have never seen a case of stricture of the rectum that was due to syphilitic ulceration.

It is most important to eliminate this question of syphilis, otherwise the patient is put on anti-syphilitic remedies to no effect, so far as the progress of the disease is concerned, and nothing further is attempted.

Early recognition of the disease will be possible by a knowledge of the character of the discharge when taken in conjunction with the other evidence already mentioned.

The cases in which I have had a successful result, have been treated on the following lines:—

The bowels are thoroughly emptied, and, at the same time, some form of intestinal antiseptic is given by the mouth.

The rectum is washed out with some antiseptic solution daily, for a week or more, the patient being kept in bed ; and, as soon as the patient's condition permits, the affected bowel is completely excised, and the healthy gut brought down and stitched to the anal margin.

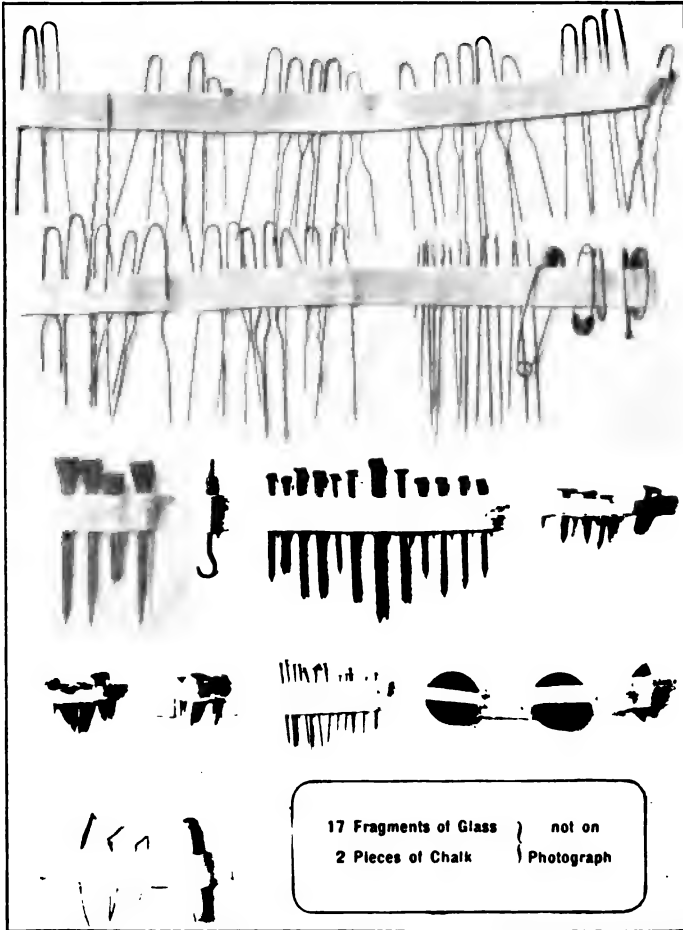
The operation is a difficult and tedious one, and has to be undertaken with the greatest care, because of the amount of fibrous tissue present ; but the ultimate result in suitable cases is most satisfactory.

There is much more to be said about this, but it must be deferred ; and I have said so much, partly because it has to do with the subject-matter of my paper, and mainly because I wish to bring strongly to your notice a disease which is seldom recognised, because so little is known about it. But if it is recognised sufficiently early, as it can be by the symptoms and signs I have mentioned, it can be cured.





PLATE XVI.



Photograph of Articles removed from Stomach.

A REMARKABLE COLLECTION OF FOREIGN BODIES REMOVED FROM THE STOMACH.

By HAROLD H. R. MacLEOD, F.R.C.S.Ed.,

Surgeon, Salop Infirmary.

[With Plate XVI.]

MRS. R., æt. 30, was admitted to the Salop Infirmary under my care on April 20th, 1903, having been sent by Dr. Lewis, of Llansaintffraid.

Her history is briefly as follows:—Two months ago she had her thumb amputated in consequence of an accident, and since then she has been much depressed in spirits, but doing her housework as usual. On April 15th, Dr. Lewis was summoned, and he kindly sends me the following note of her condition:—"Pain was complained of above and to the left of the umbilicus, where I found a swelling rounded and very tender—obviously inflammatory. T. 101·4. I was at a loss to explain its precise nature and cause. The tumour became more pronounced day by day and the temperature higher; fluctuation was present in the centre, and a smaller abscess appeared in same line (? L. rectus sheath) a few inches lower down. The bowels had acted, but the swelling had not abated, so on April 19th I suggested exploratory operation next day."

Alarmed at the suggestion, the patient confessed during the night to her husband that three weeks before she had begun swallowing various articles with suicidal intent, adding that "he was such a good husband to her she felt she could not do enough for him."

On arrival at the infirmary, on the evening of the same day, the woman repeated her story to me in much the same words. I had her placed under ether, and opened the now superficial abscess; about half an ounce of sanious pus escaped, and upon introducing my finger I found at the bottom of the superficial cavity a small hole communicating direct with the stomach. Enlarging this gently, I was able to introduce a pair of blunt dressing forceps, and to remove the

extraordinary collection of articles, which are well seen in the accompanying photograph. The stomach walls were very thick and vascular, and the opening completely shut off from the general peritoneal cavity by firm adhesions. The smaller abscess did not communicate with the stomach.

The wound was not sutured or drained in any way, the skin being dressed with an ointment of sodii bicarb. to protect it as far as possible from the action of the gastric juice.

The feeding was mainly by rectal enemata of brandy, milk, eggs, and beef-tea, with small quantities of milk, brandy, and soda-water by the mouth, but I regret to say that we were quite unable by any device to control the gastric fistula, and the woman died exhausted on April 26th.

I had the melancholy satisfaction, at the post-mortem examination held on the following day, of knowing that no particle of anything had been left behind undetected in the stomach.

I send this case for publication, as it is of interest from many points of view, particularly, I think, that the woman could have worked on, and taken her ordinary food for three weeks, after developing this extraordinary taste for foreign bodies.

The shape of some of the darning needles, too, is interesting, as, on account of their length and being so pointed at both ends, it is marvellous that they were not caught in the pharynx or œsophagus.

I have read many similar cases that have been published, and seen many museum specimens, but I cannot recollect any such varied collection as the one I have now described.



THE TREATMENT OF VENEREAL DISEASES IN THE SERVICES.

By PHILIP N. RANDALL, M.B. (LOND.),

Late Surgeon, Royal Navy.

THE Reports, recently issued by the Advisory Board for Army Medical Services on the above subject, are certainly of much interest and importance, but the one thing really needful is still wanting. This is the power to enforce continuous treatment and supervision by frequent inspections. It is something to be thankful for, that a beginning has already been made in this direction, and although it concerns as yet only a few garrisons abroad, it inspires the hope that these disciplinary measures may before long be established in both Services throughout the world.

I ventured, some six or seven years ago, when serving in the Navy, to suggest to the Admiralty that Naval Medical officers should have vested in them the power to enforce continuous treatment in all cases of syphilis, and also that every case of venereal disease should be directly under their control, as regards fitness to go ashore on leave—beyond the bounds of recreation-grounds and the like—during the time treatment is being carried on, though the man himself is able to work, and has been discharged from the sick list.

The experience, gained by service in the Naval Depot of our greatest military port, convinced me that the spread of venereal diseases is mainly—I do not say entirely—due to the men themselves, and only in a minor degree to the wretched Cyprians, who are mere incubators. Moreover, that this infectiousness is to be directly and unquestionably attributed to the miserably insufficient length of treatment and utterly inadequate supervision, which cases of venereal disease obtain, but which, such as it is, is all that is possible for Medical officers to afford under existing conditions.

The course pursued in the Navy with regard to cases of venereal disease, and of scabies,—I am speaking more particularly of the Home Depôts, the largest contributors to the

total number affected—is, that when a man is found to be suffering from one or other of these diseases, he is at once sent to Hospital. Here the case remains until the more obvious, or more urgent, symptoms have been relieved, when he is discharged, “cured.” The average time that a case remains under treatment, on board and in hospital, is under 30 days for primary syphilis, under 40 days for secondary syphilis, and about 22 days for gonorrhœa. On his return to his ship or depôt, the case is seen by a Medical officer, who is able to impose a quarantine-period of 8 days, during which time the man is not allowed to go on leave. I am not by any means satisfied, after my experience of life in a Naval Depôt, that this stoppage of leave is enforced with any rigour. If, at the end of the quarantine-period, no obvious symptoms are present, the case is finally discharged as “cured,” and the Medical officer has no further power over him. One frequently, in fact invariably, pointed out to men suffering from syphilis the necessity for continued treatment, and tried to impress upon them a sense of their personal responsibility and advantage in the matter, but few—very few indeed, in my experience—ever took any heed of the advice. Hence a man, known to be syphilitic, can remain off the sick list, entitled to and making full use of his liberty to go ashore, which he will continue to do, until the urgency of his condition again obliges him to come before the Medical officer—an urgency, which, in some cases arises, not so much from free will on the man’s part, as by dint of forcibly expressed hints and pressure emanating from indignant messmates. Again on the list the same trivial round follows:—stay in hospital—discharge to duty—8 days’ quarantine—“cured.”

Now this sort of thing is of daily occurrence in all our Home ports to an amount that is startling. The following figures are taken from “The Statistical Report of the Health of the Navy” for 1899 and 1903:—

1899.

Total Force. (Mean) - - - - 89,180.

—	Cases.	In- valided.	Died.	Days' Sickness.		
				On Board.	In Hos- pital.	Total.
Syphilis, primary -	3,415	2	—	40,017	56,866	96,833
Do. secondary -	2,304	138	4	31,345	50,547	81,892
Gonorrhœa -	5,932	42	—	58,312	70,165	128,477
Totals -	11,651	182	4			307,202

Home Station. (Average strength) - - - 48,030.

Syphilis, primary -	1,935	—	—	16,943	45,631	62,574
Do. secondary -	1,289	70	—	15,547	38,485	54,032
Gonorrhœa -	3,076	25	—	22,517	57,451	79,968
Totals -	6,300	95				196,574

Marines at Head Quarters. (Average strength) - 7,770.

Syphilis, primary -	177	—	—	1,672	4,608	6,280
Do. secondary -	199	10	—	2,244	3,309	5,553
Gonorrhœa -	387	6	—	2,905	7,622	10,527
Totals -	763	16				22,360

—	Total Force.		Home Station.		Marines at H.Q.'s.	
	Average Sick Daily.	Ratio Per 1,000.	Average Sick Daily.	Ratio Per 1,000.	Average Sick Daily.	Ratio Per 1,000.
Syphilis, primary -	265·29	38·29	171·43	40·28	17·20	22·27
Do. secondary -	224·36	25·83	148·03	26·83	15·21	25·61
Gonorrhœa -	351·99	66·51	219·09	64·04	28·84	49·80
Totals -	841·64	130·63	538·55	131·15	61·25	98·18

Total Loss of Service by Venereal Diseases.

Total force - - - - 307,202 days.

In Home Ports - - - - 218,934 "

Average Length of Time under Treatment.

Syphilis, primary - 28·35 days }
 " secondary - 35·54 " } = 63·89 days.
 Gonorrhœa - 21·66 "

1903.

Total Force. (Mean) - - - - 103,100.

—	Cases.	In- valided.	Died.	Days' Sickness.		
				On Board.	In Hos- pital.	Total.
Syphilis, primary -	3,702	—	—	48,299	64,282	112,581
Do. secondary -	2,372	95	2	34,691	48,193	82,884
Gonorrhoea -	6,480	50	—	73,670	66,751	140,421
Totals -	12,554	145	2			335,886

Home Station. (Average strength) - - 55,630.

Syphilis, primary -	2,222	—	—	26,282	51,227	77,509
Do. secondary -	1,378	48	1	19,652	35,632	55,284
Gonorrhoea -	3,316	26	—	34,016	53,217	87,233
Totals -	6,916	74	1			220,026

Marines at Head Quarters. (Average strength) 8,650.

Syphilis, primary -	215	—	—	1,633	6,183	7,816
Do. secondary -	161	4	—	2,449	2,296	4,745
Gonorrhoea -	472	1	—	4,625	9,882	14,507
Totals -	848	5				27,068

—	Total Force.		Home Station.		Marines at H.Q.'s.	
	Average Sick Daily.	Ratio Per 1,000.	Average Sick Daily.	Ratio Per 1,000.	Average Sick Daily.	Ratio Per 1,000.
Syphilis, primary -	308.44	35.90	212.35	39.94	21.41	24.85
Do. secondary -	227.07	23.00	151.46	24.77	13.00	18.61
Gonorrhoea -	384.71	62.85	238.99	59.60	39.74	54.56
Totals -	920.22	121.75	602.80	124.31	74.15	98.02

Total Loss of Service by Venereal Diseases.

Total force - - - - 335,886 days.

In Home Ports - - - - 247,094 "

Average Length of Time under Treatment.

Syphilis, primary - - 30.41 days } 65.37 days.

Do. secondary - - 34.96 " }

Gonorrhoea - - - 21.73 "

Obviously, of course, the sum of 64 days for the total treatment of primary and secondary syphilis does not fairly represent the true state of affairs, but making the fullest possible allowances for errors, the fact stands out most significantly that the treatment of syphilis in duration falls ridiculously short of the period of two years, which is now recognised to be absolutely necessary for complete cure.

This combination of niggardly treatment with no supervision surely leaves no doubt at all, as to the manner in which these diseases are spread. The responsibility for this lies entirely with the authorities, and can be in no way shifted to the shoulders of the Medical officers, who cannot exceed the very limited authority allowed them.

It is certainly illegal and a punishable offence to expose for sale goods known to be adulterated, but then the original adulterator is also liable to penalties. Cannot the same principle be applied to the traffic in question here? It was, as I believe, the one-sidedness of the former Contagious Diseases Acts which brought about their downfall,—I make bold to say, their justifiable downfall. The women were harried and hunted from pillar to post, while the men escaped practically scot-free, though really the *primum movens* in the unhappy business. It is a business which needs regulation badly enough, and if only equal treatment could be meted out to both parties concerned, a great step would be made towards a permanent reduction of an ever-increasing trouble and expense. Even if public opinion will not as yet tolerate a State regulation of vice (to use the well-worn term), the State for its own part can, and should, do its proper share in the work of prevention. It has the right to insist that its own servants shall comply with such measures, as are deemed necessary for the preservation of their health and strength, without just cause of complaint. It is, in fact, the State itself which is entitled to complain of a breach of contract. Voluntary service does not imply freedom to contract "voluntary" disablement, and so to escape the performance of duties for which engagement has been duly entered upon.

I venture to urge once more that disciplinary measures should be instituted dealing with venereal diseases on the following lines :—

1. Every man placed on the sick list for any venereal

disease, or for scabies (as this is usually contracted *more venereo*), shall be placed also on a "Quarantine List." On his discharge from the sick list as fit for work, he shall remain on the Quarantine List, and be inspected weekly, or as often as necessary, by a Medical officer. Treatment will be compulsory, and any wilful neglect thereof a punishable offence. This is really the crux of the question. The Medical officer must have the authority and power to enforce treatment, although, as he is fit to do his work, the man is no longer on the sick list. Hence the necessity for a purgatorial condition.

2. Every man upon the quarantine list shall be strictly confined to bounds, and his liberty for full leave shall only be restored to him when finally discharged as cured by the Medical officer.

3. A suitable form shall be established, and one shall be made out for each case on the quarantine list. This form must accompany the man wherever he is serving, with the same care and regularity now attaching to his pay, conduct sheets, and his parchment certificate.

4. Every case of syphilis shall be subjected to a continuous treatment of two years' duration; other venereal cases for so long as considered necessary by the Medical officer; in the case of gonorrhœa, so long as gonococci are present in the urethral discharge, however slight.

It is not suggested that any penalty shall attach to the contraction of venereal disease. In the early days of C.D. Acts a man lost pay, when placed on the sick list for venereal disease. This led to concealment of disease, with subsequent troubles all round. The statistical returns showed a fictitious improvement until the penalty was abolished. The present system of "90 days sick" without loss of pay should be retained. Herein is the service-man at an advantage over his civilian brother in misfortune, for the latter cannot claim sick pay from his club, neither is he entitled to attendance by his club doctor for such diseases.

The provision of so many opportunities for healthy occupations and recreations, in increasing numbers and variety at all naval and military stations, affords a ready means for obviating any apparent hardship in keeping men within bounds during their quarantine period.

The authorities must take the necessary steps to ensure that this keeping to bounds is rigidly enforced, and adhered to. Any evasion of this, or wilful concealment of condition, must be severely punished.

It is most emphatically not conducive to efficiency in the Service that, *in the Home ports alone*, there should be a daily average throughout the year of 600 to 700 seamen and marines, under treatment for venereal diseases, and that an amount of pay for 250,000 days should be disbursed in the year, for which not only is no return in the shape of work received, but additional and heavy expense is actually incurred. It must also be remembered, that the country receives, during the year, a goodly number of men returning from foreign service, as their ships come home and pay off. A large proportion of this influx has suffered from venereal diseases abroad, and forms therefore an additional factor in the spread of these diseases.

In view of the fact that all these cases have only received a limited amount of treatment, and are not subjected to any supervision at all, obviously a danger to public health exists, which has increased, is increasing, and ought to be diminished. As the condition of affairs in the Army is in no better case, is it surprising that venereal diseases are alleged to be increasing among the general population, and that physical deterioration is reported to be so general as to constitute a national danger? Be this as it may, the present state of things is a disgrace to the authorities.

It will be a matter for hearty congratulation, if the next Report of the Advisory Board contains a detailed account of the institution of disciplinary measures, on the lines suggested above, which apply to both Services at all times and in all places. That there are difficulties I know full well, but I am equally confident that these difficulties are quite capable of solution, provided the Medical officers are given the proper opportunity, and also the necessary position and powers, to deal with the matter thoroughly.

THE VALUE OF PAIN IN GYNÆCOLOGICAL PRACTICE.¹

By CUTHBERT LOCKYER, M.D., B.S., M.R.C.P., F.R.C.S.,

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GENTLEMEN,

IT is not necessary for me to point out the great value of pain and tenderness in the diagnosis of gynæcological diseases. Pain is often the first, or indeed the only symptom complained of by women, and we cannot enquire too fully into every detail concerning it.

Before discussing pain from a purely clinical point of view, perhaps you will pardon my taking you back to what we learnt about it in our physiological text-books. The skin is regarded as a sensory organ having to do with the sensations of touch, temperature, and common sensibility, and some would add of the special sense of pain. Now there are many difficulties to be overcome before we can accept the view that pain is a special sense, and it seems more satisfactory to look upon it as an exaggeration of common sensibility. The afferent impulses of common sensibility normally produce their effect without giving rise to any sharp change in consciousness; but when they assume a certain intensity, they break in upon consciousness, and produce a psychical phenomenon, and this is what we call pain.

Pain is quite distinct from the sensations of temperature and touch; we know this because, if the epidermis is removed and a sharp or hot body is brought into contact with the raw surface, we fail to appreciate the sharpness or the heat, but we nevertheless suffer pain. This suggests that common sensibility and its exaggeration which we know of as pain, need no special nerve endings. The afferent impulses which give rise to painful impressions are thought to pass up to the brain in the gray matter of the spinal cord. When this part of the cord is destroyed, as it may be in syringomyelia, the sense of pain is lost.

¹ A post-graduate lecture delivered at the Samaritan Hospital for Women.

Psychologists tell us that the seat of painful impressions is the cortex cerebri. In what part of the cortex certain afferent impulses become transformed into perceptions of pain, we do not know.

So much for pain from the physiological standpoint ; for our present purpose we are about to regard pain as a *symptom*, and in endeavouring to make the best clinical use of it, we must investigate its relation to the viscera in a systematic manner. This task has already been performed by Dr. Head, and I propose to give you the result of his investigations so far as they concern the gynæcologist.

In all visceral diseases, whether thoracic, abdominal, or pelvic, Head has shown that areas of pain and tenderness are developed which correspond with the regional supply of the various spinal segments. These areas can be distinctly marked out, as they do not overlap to any great extent. They are the areas picked out by the eruption of herpes zoster as well as by the pain and tenderness of visceral diseases. *Vide* Figs. 1, 2 and 3.

Head showed that the pain of which a patient complains in visceral disease, always lies within the areas of tenderness, but both pain and tenderness need not be present at the same time. The tenderness of visceral disease is not deep-seated, it is purely cutaneous or subcutaneous. One of the best methods of showing it, is to pick up the skin gently between the finger and thumb.

The areas of tenderness bear a definite relation to the different organs affected, so that we can speak of the *ovarian*, or the *tubal* area of tenderness, and so on. The tender area may be referred to the opposite side of the body to that occupied by the organ affected.

The superficial reflexes are usually exaggerated over the tender areas produced by visceral disease.

We will now follow Head's description of referred pain and tenderness caused by disease of the ovary.

He calls "ovaritis" the bugbear of the gynæcologist, and rightly so, owing to the general disturbances it is liable to produce.

If an ovary is normal, pressure upon it, during vaginal examination, causes no pain, but a sickly sensation. If the ovary is inflamed or prolapsed and œdematous pressure causes

pain, the latter is localised by the patient in the loin behind, and at a spot below and to one side of the umbilicus in front. These painful spots lie in the *10th dorsal segment*, and are often accompanied by tenderness of the whole segment, *vide* diagram taken from *Brain*, 1893. *Vide* Figs. 1, 2, and 3.

The appendages when normal are not tender or painful to palpation, but are definitely so, if inflamed.

The pain is situated over the *5th lumbar and 1st sacral spines* behind, and in the groin above Poupart's ligament.

After removal of the ovaries the stump is sometimes tender, and Head recalls a frequent observation that, after removal of an ovarian tumour, the patient complains of pain in the loins, which is eased by placing a small pillow in the hollow of the back.

In injuries of the tube—tubal foetation—for example, the pain is lower down, *i.e.*, over the upper part of the sacrum, the tube being particularly associated with the *11th and 12th dorsal segments*.

Cervix and os uteri. Erosions and early malignant disease of the vaginal surface of the cervix produce no pain, but directly they set up cervical catarrh, and begin to invade the broad ligaments, pain begins. In passing a Playfair's probe, we notice that as it enters the external os, the patient is unconscious of its presence. As it ascends the canal she begins to complain of pain over the *lower sacral region*. As the probe advances still further, the pain alters in position, and is situated over the *last lumbar and 1st sacral spines* and in the *groin in front*. This pain may be accompanied by surface tenderness, especially in cases of catarrh of the cervix.

The uterus, like the bladder, causes referred pain and cutaneous tenderness over a double set of areas.

Anything which stretches the lower segment, and especially the cervical canal proper, causes pain and tenderness over the *4th, 3rd, and sometimes 2nd sacral areas*. *Vide* Figs. 1 and 3.

Painful contractions of the body of the uterus affect the *11th, 12th, and sometimes the 10th dorsal areas*, and occasionally the 1st area of the lumbar segment. *Vide* Figs. 1, 2, and 3.

Head sums up the features of referred pain as follows :—

It tends to follow the lines of spinal segments rather than those of peripheral nerves.

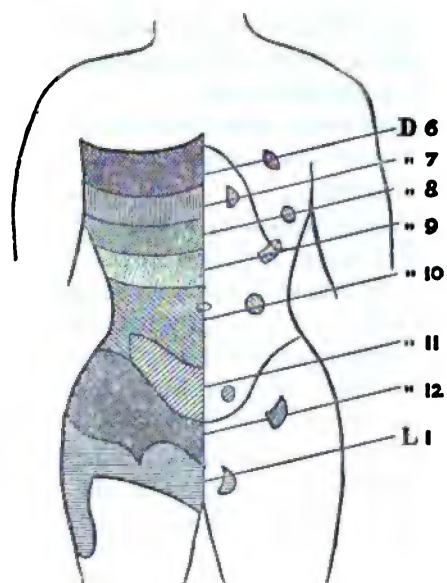


Fig. 1. Anterior view of painful areas corresponding to the various spinal segments. The small shaded areas mark the points of maximum intensity of pain and tenderness.

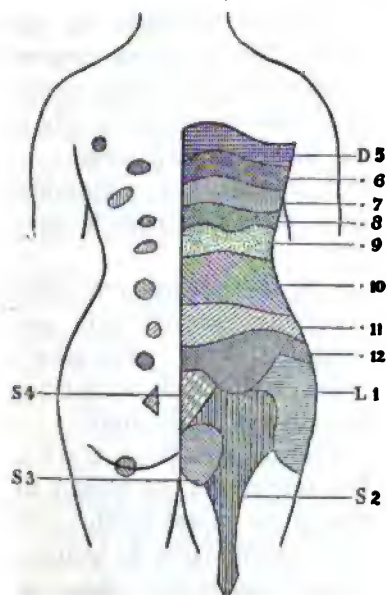


Fig. 2. Posterior view.

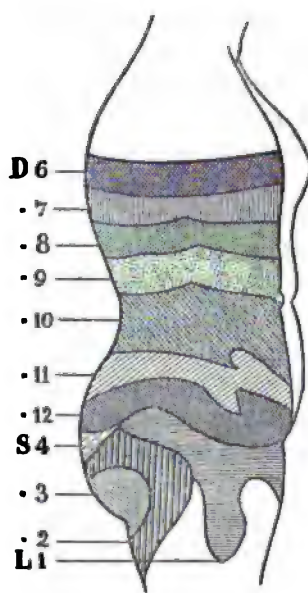


Fig. 3. Lateral view.

It tends to form bands round the body, and thus, in diseases of the abdomino-pelvic viscera, the pain may be quite as marked in the back as over the abdomen.

It is mostly associated with cutaneous tenderness, which may be quite as marked at a distance from the affected organ as in its neighbourhood.

Thus intestinal disorders may cause a band of tenderness extending round the body, not only in the loin, but also overlapping the summit of the iliac crests on its way to the front.

In peritoneal affections it is far different. As Head points out, the referred pain here does not follow the nerve areas. A patient will complain of pain both above and below the umbilicus, but not in the back and loin. There is no true cutaneous tenderness in peritonitis. The tenderness which is present, is not elicited by picking up the skin between the finger and thumb, but directly gentle pressure is used, it will cause intense pain.

Therefore note this great difference, *firm steady pressure will relieve reflex abdominal tenderness, but in peritonitis it will cause intense pain.*

Then, again, the tenderness of peritonitis may be present all over the abdomen, from the ensiform cartilage to the pubes, and from one side to the other, but it never appears at the angle of the scapula or over the sacrum and iliac crests. In fact, it only makes its appearance over those areas where pressure can make itself felt on the inflamed peritoneum.

However great the pain in peritonitis, the abdominal reflexes are not exaggerated, because the tenderness is deep and not cutaneous.

We see, therefore, that affections of the peritoneum differ from those of the viscera, in not causing referred pain and cutaneous tenderness, but in producing local pain which follows the lines of peripheral nerves, and which is accompanied by deep tenderness over the affected point only.

Head has further shown that, in visceral affections, there is a great tendency for both pain and tenderness to spread to the opposite side of the body at the same spinal level. The area which is most commonly affected secondarily in women, is the *10th dorsal*, then the *sixth or inframammary*, then the various gastric areas.

The changes in the nervous system accompanying menstruation must be put down as one of the most potent causes of diffusion of visceral pain and tenderness. This accounts for the spread of pain in dysmenorrhœa. The most favourable cases of painful menstruation, from the point of view of prognosis, are those in which the pain does not precede the flow; where flow and pain come on together, some curable cervical condition may often be found to account for the latter, such as a polypus or catarrh.

It is otherwise when the pain comes on several days before the flow, and is situated over the ovarian region; this kind of dysmenorrhœa, of which I shall presently give you an example, is usually associated with a weak nervous system, and generalisation of pain and tenderness becomes extreme by the time the flow is established, all the areas which correspond to the pelvic organs are affected, and even the leg. Not only do the abdominal reflexes become exaggerated, but also the knee-jerks.

Again, anæmia is a common cause of such generalisation.

If an anæmic woman menstruates, she not only has pain over the 10th, but over the 6th and 7th dorsal areas, and in the occipital and mid orbital regions.

As soon as generalisation has become established, local measures cease to afford relief, and the removal of an affected organ will, under such conditions, only add fuel to the fire, by superimposing a second cause for diminished resistance. Now, in the history of the development of gynæcology, we see that, as the methods of local examination of the internal genitalia became more and more developed, so, nervous symptoms of reflex type were found to be due to local conditions, and, when the latter were successfully treated, the former disappeared. But such symptoms, when they became so manifold as to almost defy classification, and to merit the term "protean," are not to be treated by subjecting the patient to minor gynæcological interference. Matthews Duncan so opposed the tendency in his day to meddling gynæcology in the treatment of women of the "protean" type, that he taught his pupils that the "protean" symptoms had nothing to do with the state of things in the pelvis. It is here that we see the

necessity of being wise physicians before we assume the rôle of operative gynæcologists. I cannot emphasise my meaning more clearly than by citing a case which I have recently seen in consultation with a friend in general practice. Mrs. W., aged 34 years, had been married during 10 years. Had one child nine years ago, no miscarriages. The child is now a strong healthy boy. Menstruation began at the age of 15. It had always been irregular and painful, only coming on at intervals of from two to five months. Since marriage these long intervals had lessened, but the pain had not abated. It comes on 14 days before the flow, and reaches its climax on the day the flow is established, then the severity lessens. The periods are scanty, lasting only two days, there is often a brown sediment at the finish. A yellow discharge follows after the period is over. The pains are labour-like, they start in the small of the back, and radiate round to the front in a broad band, the upper limit of which is at the umbilical level. They dip down to the groin and beyond into Scarpa's space. Behind they radiate to the hips and over the gluteal region. They are simultaneously felt in both breasts, especially the left. With the acme of the pains, nausea is complained of, and as the pain is passing off, the patient suffers from vertical headache and mid-orbital neuralgia, whilst, during the height of the dysmenorrhœa, the left eye is very painful. There is loss of appetite, with a necessity for taking aperient medicine constantly. Micturition is accompanied by a sense of pressure before the act. The feet and legs swell when standing. The patient wears glasses. The tongue is coated and dry. Inquiry into her family history revealed the fact that she was born the weaker of two twins.

The patient's father had acute mania, and died in a lunatic asylum at the age of fifty-six years. One paternal uncle was weak intellectually. The patient's brothers and sisters were all people of intellectual and business abilities. I found on examination (which was conducted a week after the patient's last period) that there were areas of cutaneous tenderness and increased superficial reflex excitability over the 6th, 7th, and 8th dorsal areas (*vide* diagram) on the left side, with maxima in the epigastrium and over the border of the 9th rib, and between the shoulders. Also over the 10th dorsal area with a maximum, in front, over a point $1\frac{1}{4}$ inches internal

to the left anterior superior spine, and behind, over the upper lumbar spines. There was no tenderness in the groins nor over the sacrum, none over the skin of the thighs. There was tenderness all up cervical spine, especially over the 7th cervical and 1st dorsal spines. Per vaginam the uterus was anteverted and slightly anteflexed. It was mobile. The cervix was not eroded, the os not patulous. The left ovary was easily palpable and tender, the pain, on examination, was referred to the left of the umbilicus and to the lumbar spine. No other lesion was found in the pelvis. The patient had been treated by a specialist for what he told her was congestion of the womb; this was three years before I saw her, and she got worse under treatment. I may add also that three years ago the patient lost her mother, and had, as a result, an attack of acute hysteria. Now this case illustrated many important points. As a girl, the patient suffered from an abnormally sensitive nervous system. With the onset of menstruation, there came dysmenorrhœa of the ovarian type—ovarian pain starting fourteen days before a period, lasting and becoming intensified whilst the flow continued. Then followed marriage with the strain of reproduction and nursing. The labour was spontaneous, there was no tear, and although nothing had been done to prevent subsequent conception, the latter had never taken place. This is a common history among these neurasthenic patients. Any mental shock will aggravate the symptoms of pain and tenderness from which these patients suffer, and, in this case, the woman had grown markedly worse since her mother's death. I have stated the details of this case, in order to demonstrate a type of patient we all know only too well, and to state that local treatment, when employed at the stage of diffusion and generalisation of ovarian pain, is worse than useless. What, therefore, is to be done for this large neurasthenic class? Remember they are not the subjects of neuromimesis, although, as in the case of Mrs. W., they may be the subjects of hysterical attacks, they are, as you will have gathered from the case I have cited, poor depressed women, whose reflex irritability is increased, and in whose spinal cord the cross-resistance to painful impulses is diminished. There is only one line of therapeutics to be followed with any hope of success, and that is the "Rest treatment," the perfecting of which we owe to our American colleagues.

This system now passes under the name of Weir Mitchell. The principles and details of the so-called "Rest-cure" are not so well known in England, that I need apologise for devoting a short space to this subject. Those who wish to study the subject in Weir Mitchell's own words, should read his article entitled "Rest in the Treatment of Nervous Diseases in Seguin's series of American clinical lectures," vol. I., No. 4, also an article entitled "Fat and Blood, an Essay on the treatment of certain Forms of Neurasthenia and Hysteria," and also "Lectures on Diseases of the Nervous System, especially in Women," both by the same author, S. Weir Mitchell. In the admirable English classical treatise by Hilton, we are taught the therapeutical value of rest in assuaging pain; but he approached his subject from the purely surgical point of view, and for the moment we are considering a disease, which belongs to the domain of systematic medicine, and as such, can be dealt with only by the well-informed physician. The treatment of Rest in Neurasthenia may be divided into partial and complete. I shall only deal with the latter, and that very briefly. This radical treatment implies rest in bed extending over a number of weeks. The patient must not sit up except for meals, nor leave the bed, except for the purpose of emptying the bowels or bladder. In the worst cases the nurse must feed the patient.

Isolation, or the exclusion of relatives and friends, and the interruption of all correspondence, must be insisted upon, the idea being to secure mental as well as bodily rest.

A special nurse must be provided who has undertaken similar cases; she must sleep in the same room or in one adjoining.

High Feeding.—Pain has been described as the cry of the nerves for food. We must therefore raise the nutrition of the patient as high as possible, by supplying materials of which the system stands in need. Here we must remember that the neurasthenic patient often shows a deficient elimination of uric acid and its allied alloxuric bodies. Red meats, therefore, and starchy food are contra-indicated. Potatoes and ordinary wheaten bread should be avoided. Pulled bread, bran bread, gluten bread, Zwieback, may take the place of wheaten bread. Fats should be avoided at first, except a small quantity of butter. White meats, fish, chicken, oysters,

and succulent vegetables should be taken freely ; celery, lettuce, watercress, ripe fruits, may be added. For constipation, stewed fruits, baked apples, without sugar, may be given.

Milk should be given with the above mixed diet in large quantities. Begin by adding a definite quantity of milk, say, from four to six ounces, to each meal, and order an equal quantity to be given between meals and on going to bed, making in all six draughts of milk per diem. The quantity of milk should be increased until three pints of fresh milk are taken daily. If the patient should positively refuse milk, egg-food must be substituted. The underlying idea is to give excess of food at frequent intervals.

Massage.—To maintain health, whilst the patient is kept at absolute rest in bed, and is over-fed, we must exercise the tissues in a passive manner. At the onset, massage should be very gentle and superficial, and applied for a short time only, then gradually it may be increased both in intensity and time, until full massage of the entire body, for one hour twice a day, can be tolerated. After some weeks in bed, passive movements of the limbs, and finally movement-with-resistance should be practised.

Electricity is a useful adjuvant to massage. It stimulates nutrition. It should be used in the form of a slowly interrupted current (faradic), and first limited to the flexors and extensors of the legs, and later applied to the thighs, arms, and trunk. The time should be, first, ten minutes, later, twenty, and finally, forty minutes.

Bathing.—This should be represented at first by warm sponging between the blankets, and gentle friction with a towel afterwards. Later, a warm Sitz-bath by the bedside may be taken daily. Cold douching and showers should be used when, towards the end of the treatment, the strength is well restored.

Weighing.—The weight should be taken at intervals of every two or three weeks.

The Conclusion of the Rest Treatment.—When the patient is first allowed to get up, active exercise must be confined to walking round the bed-room, then calisthenic exercises are to be used ; finally, she may rise at 11 o'clock, sit up for two hours, rest until 4, and go to bed after supper at 7 o'clock. The treatment is completed by sending the patient away to

the sea-side with her nurse, the latter gradually withdrawing her assistance in dressing the patient, and in other small matters.

Drugs are quite of minor importance. A little nux vomica, cardamoms, and gentian before meals is a digestive adjuvant. Arsenic is a nerve stimulant and may in some instances do good, given as Fowler's solution, m. 2, in water, ten minutes before meals. A cup of hot water before breakfast is useful in cases of gastric catarrh. Other nervine stimulants are castor, assafoetida, and valerian. Quinine is useful as a bitter and appetizer. Iron is indicated if anæmia is pronounced. I would repeat, however, that in the Rest treatment of neurasthenia, drugs take a very subordinate place. I have watched the effect of such treatment as that outlined above, in several instances, and have convinced myself of its efficacy in cases of neurasthenia properly chosen. There is room here for a word of caution as to the selection of cases. We must not employ it in cases where severe bodily pain, long continued, has resulted in melancholia; such cases must be referred for treatment to the neurologist and brain specialist. On this point Clouston says: "It appears to me that physicians in general practice frequently do not realise the significance of slight mental depression, accompanying or following neuralgia or sensory perversions. The border-land between neuralgia and melancholia, I look upon as a very slight one indeed, they are both manifestations of one type of neurotic diathesis. The seat of both is the brain cortex, and in the same part of the cortex, though not in the same cells. The actual cortical conditions under which mental and bodily pains arise would appear to be the same, therefore it seems clear that they should not be studied or treated apart from each other." After reading the above, we come to regard melancholia as mental pain, and practically of the same nature and origin as the functional bodily pains, such as we have been considering. It is not to be wondered at, therefore, that the one, if persistent, merges into the other.

So far I have dealt exclusively with pain of a diffuse and generalised character. I have placed this first, because I believe that neurasthenic women, in whom it is demonstrated, are apt to be misunderstood, they are liable to be classed as hysterical, and all idea of rational treatment is abandoned.

But if by hysteria we mean a state in which diseases are imitated, copied, and assumed by the patient, then neurasthenia is not hysteria. There is an organic cause underlying the commencement of the pain which starts the vicious circle we call neurasthenia. In hysteria the case is very different. This disease is cortical in origin, the general nervous system being secondarily involved. The disturbances of sensation bear no relation to nerve distribution nor spinal segmentation. Hyperalgesic areas cannot be mapped out in a physiological manner, such as Head employs in the localisation of true peripheral pain. The clinical course of hysteria, again, is totally different from that of neurasthenia. In addition to such sensory disturbances as anæsthesia and hyperæsthesia, there are motor symptoms unknown in neurasthenia. These are paralysis, contractures, tremor, and inco-ordination. Again the visceral disturbances, such as anorexia nervosa, tachycardia, rapid breathing, peculiar barking cough, fever, retention of urine, polyuria, distended abdomen, vaginismus, are all purely hysterical, as are also the various perversions of the special senses. Similarly, the "hysterical attack" and delusions, the vain theories of disease, all help to form a clinical contrast to what I have described as neurasthenia.

The confusion of mind which exists in regard to the two conditions is due to the fact that neurasthenia and hysteria often co-exist in the same patient, but we must never lose sight of the fact that hysteria is primarily a cortical lesion, whilst the neurasthenic state has some peripheral lesion as its initial cause. The Weir Mitchell treatment applies equally well to hysteria as to neurasthenia, but to it must be added "suggestion," as the American writer, Dercum of Philadelphia, says, "The whole gamut of human motive—pride, ambition, self-love, filial, parental, or conjugal affection, the sense of right and wrong—may, as occasion requires, be played upon to aid the patient's recovery."

I now pass on to consider chronic ovarian and uterine pain. Chronic ovarian pain might form the subject of a treatise in itself, if one attempted to deal with all its causes. To bring it within the scope of my present purpose, I must confine myself to those cases where the ovary is quite movable, there being no disease of the adjacent pelvic structures. I shall not therefore deal with gross inflammatory lesions and neoplasms. You

may take it for granted that an ovary, bound down by adhesions, is a painful organ, but with such conditions I shall not deal at present. Ovarian pain is diagnosed, as I have already pointed out, by its position. It has its maximum in the 10th dorsal area at a point 2 inches internal to the anterior superior spine, and this is a spot, as definitely located by the patient, as McBurney's point is shown in typical appendicitis. It is generally on the left side of the body for reasons pointed out by Champneys and Herman, viz., that the left side is weaker than the right, and it may be added in passing that all referred pains, and the tenderness accompanying them, are commoner and better marked upon the left side of the body. The spot just located marks the maximum of ovarian pain, but the latter radiates, so as to be felt behind at the posterior maximum spot, just above and in a line with the sacro-iliac amphiarthrosis. In extreme cases, it is referred to the 6th dorsal or inframammary area of the left side. Secondly, the ovary itself is tender, especially when examined bimanually, and, even when there is no tender abdominal area, the latter is elicited after examination of the ovary itself, when a tender band can be mapped out corresponding to the 10th dorsal segment. This can all be demonstrated in cases where there is no evidence of fixity of the internal organs. What is the cause of such ovarian pain? It is frequently first noticed when menstruation starts. It begins some days—a week or more—before the flow, and gets worse during the early days of the period, the flow may be scanty, but the main feature is the pain and tenderness over the areas above described. Galabin says it is relieved by marriage, Herman says it is aggravated thereby, and my own experience supports that of the latter authority. Nothing is known as to its cause. It is a common association of neurasthenia, and, given the two conditions, the diffusion of the pain may be extreme. As Herman points out, the local pain is much influenced by the amount of attention that is paid to it; therefore, the treatment should be to draw the patient's attention away from the pelvis, and to follow the general rules laid down for neurasthenic patients.

In searching for conditions which are associated with chronic ovarian pain, I have reviewed the histories of 381 cases of pelvic pain complained of by women in my out-patient clinic. I find that, in 111 of these cases, the pain complained of

was in the region which I have described as "ovarian," and of these 111, there were 49 in which there was no gross pelvic lesion, no prolapse of the pelvic floor, nor displacement of the uterus. In these 49 cases, the uterus and adnexa were freely movable. Forty-three of the patients were married, 6 were single, *i.e.*, 18 per cent. concerned women who had large families or who were suffering, at the time of examination, from hyperlactation.

Case 1.—Pain in the left 10th dorsal area. Left ovary tender but quite mobile. Aged 37, married 16 years, 11 children, last confinement 7 months ago.

Case 2.—Pain in the 10th dorsal area. Erosion of cervix. Aged 30, married 10 years, 6 children, last confinement 15 months ago.

Case 3.—Pain in the left 10th dorsal area. Married, age 24 years, 3 children, last confinement with twins 14 months ago, still nursing, lactation atrophy of mobile uterus.

Case 4.—Pain in the 10th dorsal area. Aged 26, married 6 years, 3 children, nursing a 10 months old baby.

Case 5.—Pain in the 10th dorsal area. Aged 31, married 5 years, 2 children, nursing a baby 5 months old, erosion of the cervix.

Case 6.—Pain in the left 10th dorsal area. Aged 27, married 3 years, 2 children, nursing a baby 10 weeks old, cervix lacerated.

Case 7.—Pain in the 10th dorsal area. Aged 31, married 5 years, 2 children, nursing a baby 5 months old.

Case 8.—Pain in the 10th dorsal area. Aged 28, married 14 months, nursing a baby 7 months old, erosion of the cervix.

Case 9.—Pain in the 10th dorsal area. Aged 39. Married 20 years; 11 children; 5 abortions, last 18 months ago; ovary prolapsed. These cases show that child-bearing and lactation are fruitful sources of chronic ovarian pain. After what I have said about this type of pain and its close association with neurasthenia, it is not surprising that anxious mothers, whose nervous systems have had to bear the strain of multiple, and quickly-repeated, pregnancies with prolonged lactation, should fall victims to neurasthenia and its associated aches and tender areas. Whenever possible these patients should leave home for a period of rest, change of air, and give up nursing. They are often the victims of insomnia, and the

best drug for this condition is bromide of sodium, in 10-grain doses, three times daily. It can be combined with carbonate of ammonium, and given before meals.

Quinine, strychnine, and iron, are useful in their turn. An occasional blister over the maximum spot of pain will do good, and vaginal douches at 112° F. will soothe the patient. It will be noted that four of the nine cases had erosion of the cervix, so that attention must be paid to any local lesion which may be present. Erosions which require treatment, are accompanied by a yellow muco-purulent discharge, the result of cervicitis. This should be treated by swabbing as high as the internal os with wool on a Playfair's probe, saturated with 10 per cent. copper sulphate, followed by a douche of tannate of zinc.

Of the remaining cases of ovarian pain, the causes are very various. In some, it dated from the time of the first menstrual epoch, constituting a definite type of dysmenorrhœa, to which I have already referred to as "ovarian." In others it seemed to be the outcome of spasmodic dysmenorrhœa. It is not infrequently one of the symptoms complained of at the menopause, associated with pseudocyesis, globus hystericus, and other neuroses. Then comes a long list of various organic lesions, *i.e.*, inflammation, new growths, traumatism and displacements, into which I cannot at present enter, but must pass on to the question of uterine pain. I will confine my remarks to chronic uterine pain.

One of the most striking symptoms on physical examination, in some women, is the pain and tenderness produced by bimanual palpation of the uterus, and the point to settle in every case, is whether the cause lies in the tissues of the uterus itself, or is due to some slight plastic peritonitis in its immediate neighbourhood. With obese patients, it is often impossible to decide without an anæsthetic, what range of mobility the uterus has, but the uterus which is tender and painful is always a bulky organ. It need not necessarily be displaced, although it is often retroverted and retroflexed. The common view of such a condition is that the walls of the uterus are thickened by the deposit of new inflammatory fibrous tissue within them, and, in some cases, I have no doubt that this is so. I have had frequent opportunity of studying the involution processes, which go on in the human uterus after delivery, that is to say, I have examined the walls of uteri removed by

Porro-Cæsarean section, uteri removed for early chorio-epithelioma following vesicular mole, uteri removed as the site of infection in puerperal fever. Such material has taught me that no part of the wall of the uterus is exempt from the effect of inflammation in all its grades—from simple round-celled infiltration of the muscle to organisation or necrosis and actual suppuration. Now, I believe that the painful, tender uterus is an inflamed organ, and I think that in endo-, myo-, and peri-carditis we have an illustration of what we may find in the uterus, endo-metritis, chronic metritis, peri-metritis. I am well aware that this is not orthodox, but I must be content here to express my opinion, based upon histological investigations, and leave the fuller discussion of the subject for some future occasion. The commonest cause for chronic metritis is abortion, the uterus becomes infected, its walls infiltrated, and sub-involution results.

In such case the uterus is bulky, painful, and tender when pressed between the fingers. The pain and tenderness is principally in the hypogastric area and over the upper part of the sacrum. The pain is a constant dull ache, and is accompanied by menorrhagia, which ergot does not influence, and which curetting does not always check. This kind of uterus, from the symptoms of constant pain and exhausting hæmorrhages, often deserves the name of "clinically malignant." I can recall five instances, in the practices of leading London and provincial gynæcologists, and one, in my own hospital experience, in which hysterectomy was performed for such a condition. The great aim in practice is to tide these patients over until the menopause, when senile atrophy will cure the hyperplastic chronic metritis. Sometimes pregnancy may supervene, when, if the puerperium is healthy, normal involution may be restored.

The treatment of such cases will consist of a sedative ergot mixture given, say, for ten or twelve weeks, accompanied by hot vaginal douches at 115° F., counter-irritation of the hypogastrium, and the application of leeches to the cervix. Glycerine and ichthyol tampons inserted daily are useful, as they secure local depletion by the hygroscopic power of the glycerine, whilst the ichthyol is an antiseptic.



NEEDLE IN HAND.

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THIS is always a common injury, especially among women ; but although the accident is constantly occurring, cases are particularly numerous towards the latter part of spring. The explanation of this seasonal variation is probably to be found in the fact, that curtains, carpets, rugs, etc. are cleaned, moved and altered, in the process known as "spring cleaning," more especially at this time of year, and the needles which have been carelessly left sticking into them, are brought painfully to light. When the needle projects above the skin, the patient removes it herself, and you hear nothing of it ; but when it is broken off or is entirely embedded, she usually sooner or later seeks advice. Sewing-machine needles also give trouble. The needle generally tranfixes the terminal phalanx and nail of the index finger or the thumb, and breaks off. It is, as a rule, easily extracted if firmly grasped by Spencer Wells' forceps.

It is surprising how rarely needles, having no cotton attached, suppurate, even though they remain in the tissues for a long time. Unless they are nickel-plated, needles turn black in a few hours, probably from the formation of iron sulphide. This change of colour is a great assistance to the surgeon, as the whereabouts of the needle is thus so much more easily discovered. After remaining in the body for several months or years, a needle will be found to have become larger and very brittle. It rusts, as it were, into the tissues, and if its removal is attempted it will be found to be firmly adherent, and can only be got away, if dissected out, with some connective tissue attached.

Usually the only symptom, which a patient thus injured complains of, is pain. Occasionally the needle may tranfix a tendon and interfere with movement, but this is rare. Local pain when either end of the needle is pressed on, is very characteristic, and may be present even when the needle is in the deeper tissues, which are usually much less sensitive

than the skin. This localised tenderness on pressure is often a material aid to the surgeon, when searching for a needle in a deep wound.

It is well, when a patient thinks she has part of a needle in her hand, to begin by carefully palpating the region where it is supposed to have entered. I have often been able, in this manner, to detect the presence of a needle in patients sent up to the hospital to have it localised by the X-rays. A little hard knob under the skin, especially if tender, is an almost certain indication of its whereabouts. If nothing can be felt, the X-rays are practically essential, unless the injury is very recent, and the place where the needle entered can be seen. In this case it may be possible to find the needle by cutting down in a line joining the point of entry to the most tender spot, but this is a very uncertain method. With the X-rays and a screen a needle can be plainly seen in any part of the hand, and, taking care that the rays are parallel, its position may be readily marked on the skin with a blue pencil. There are many elaborate methods for determining the depth of a foreign body below the surface, but in the case of the hand, it is usually sufficient to move the end of a probe over the skin, till, with the rays parallel, its extremity and one end of the needle appear to coincide. Then, by rotating the hand probe and screen together backwards and forwards, a fairly accurate idea of the distance of the needle from the surface can be obtained by the amount of apparent displacement, which takes place on the screen between the shadows formed by the needle and the end of the probe.

In all cases, excepting those of young children, and perhaps some very nervous women, eucaïne will be found the best anæsthetic. I generally use a 1 per cent. solution of the hydrochloride, and sometimes add two or three drops of a 1 in 1000 solution of adrenalin chloride to each syringe-ful to check hæmorrhage. A much more certain method of securing the absolutely bloodless wound, which is so essential, is by means of a tourniquet round the wrist; indeed I almost invariably place a Petit's tourniquet over the radial and ulnar arteries before cutting down, but do not screw it up unless difficulty arises. Still, adrenalin does no harm, and the tabloids of eucaïne and adrenalin, which are now put up ready mixed

are very handy. In injecting the eucaïne, the first prick of the needle is the only one felt, if the injection be made centrifugally round this point. It is best to inject close beneath the skin, so that the latter is rendered temporarily anæmic ; a few minims in the deeper tissues will also be of service. Relatively large doses of eucaïne are quite harmless ; I have injected as much as 240 minims of a 1 per cent. solution at once, without any unpleasant symptoms arising. All the cleaning up necessary should be done before the eucaïne is injected, as its effect begins to wear off in a quarter or half an hour.

It is well, before making the incision, to think over the anatomy of the part. Note carefully the position of the nerves, as well as that of the arteries in the palm, and remember that the superficial palmar arch is more superficial than one might, at first sight, expect it to be. Then cut down on the needle, where it is nearest to the surface as shown by the X-rays, unless some important structure intervenes. An incision more or less vertical is best calculated to avoid important structures. Muscles should be split in the direction of their fibres, whenever possible, not only because they are less injured if thus dealt with, but also because, other things being equal, lacerated muscle is more liable to suppurate than any other tissue.

When the incision is apparently of sufficient depth, have the edges of the skin well retracted with blunt hooks, and commence searching for the needle. In doing this, the sense of sight will be of much greater assistance than that of touch, and to be able to see a small object like the end of a needle, an absolutely bloodless wound is essential. Sometimes a slightly stained area will indicate the direction to be followed, and occasionally, in the case of a finger, I have been assisted by holding up the wound to a lamp, and looking at it by the light transmitted through the tissues. Sometimes also, when a small piece of needle has entered a tendon sheath, or pierced the transverse metacarpal ligament, the puncture, which it made on entering, may be visible. If no needle can be seen, the finger may be placed in the wound (the little finger takes up least room), and the needle sought for by the sense of touch, and not infrequently, even if the

surgeon is unable to feel it, the patient, owing to the localised tenderness, can say confidently when the needle is pressed on. If, after careful search, the needle is not found, the patient should be taken back to the X-rays, but with a bloodless wound this is rarely required. A probe in the wound is, by means of the rays, approximated as nearly as possible to the end of the needle. The screen is then removed, and the lights turned on, and the search continued in the direction thus indicated. On removal of the tourniquet one or two small arteries usually need twisting off.

There is nothing special to say about closing the wound. It is useful to irrigate with some weak antiseptic, and use horse-hair or silkworm gut sutures, passing them through the whole thickness of the skin, and in the case of the palm, including also the palmar fascia. This ensures thorough closure of the wound, and a drain is not required. Also, if the wound is at all extensive, a splint is generally advisable, as otherwise the patient is likely to use her hand, and healing might thereby be retarded.



THE CULTIVATION OF THE PARASITES
OF SMALL-POX AND VACCINIA IN VITRO.

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[With Plates XVII.—XVIII.]

WITHOUT enumerating the large number of media in which these parasites would not reproduce themselves in pure culture, it may be of interest to record that the sera, and defibrinated blood of man, the monkey (rhesus), the horse, the calf, the rabbit and guinea-pig were used as media with negative results. These sera were used both in the fresh state, and after their germicidal constituents had been destroyed by heating to 55° C. for one hour.¹ This result is in accordance with the general experience that to insure successful vaccination, as little blood as possible should be drawn at the site of inoculation. It also conforms to the observation of Calmette and Guérin² who found that the blood of a rabbit, into whose veins calf lymph had been previously injected, though acting as the distributor of the virus, is in itself incapable of conveying the disease to a second rabbit. More recently it has been shown by Magrath and Brinckerhoff³ that the blood of small-pox patients obtained by puncture of the ear, when inoculated upon the cornea of the rabbit, does not produce variolous keratitis.

The serum of a person, immune to small-pox, does not appear to have much effect, for no marked agglutination or lysogenesis takes place when the parasites are suspended in such a serum.

The first attempts at artificial culture of the parasites were made in the absence of any symbiotic bacterium. The method of symbiosis seems to be the one which has been chiefly fruitful of result in amoeba-culture. Beyerinck, T'sujilani, Frosch, and more lately Musgrave and Clegg⁴ have shown that certain

¹ Vaughan and Novy: *Ptomaines and Leucomaines*.

² *Annales de l'Institut Pasteur*, March, 1901.

³ *Journal of Medical Research*, February, 1904.

⁴ Musgrave and Clegg: *Amaba: Their Cultivation and Aetiological Significance*, Manila.

amoebæ show selective affinity for special bacteria. It is certain, however, that the amoebæ variolæ vel vacciniæ at any rate in the pocks grow and multiply without the assistance of any special bacterium. By first washing the pock with an antiseptic and then opening it with a sterile needle, variolous matter can be obtained free from adventitious germs, up to the eighth day of the eruption, which date, it will be noticed, is coincident with pustulation in small-pox.

The Medium.—I have found that the parasites of small-pox and vaccinia will grow and multiply in pure culture in the vitreous humour of the rabbit's eye, while the vitreous of the monkey (rhæsus), and that of the unvaccinated calf give practically no result. The medium can be obtained in a sterile condition by withdrawing it from the inside of the eye of a freshly killed rabbit, with a sterile hypodermic syringe. Care should be exercised in the operation to procure the medium in a clear condition; it is also advisable to collect it in a vessel in which it can be centrifugalised, the object being to free it from any cellular element which might obscure the issue. After being thoroughly centrifugalised, the clear supernatant fluid should be pipetted off and distributed in small tubes, capped with rubber sheeting to prevent subsequent evaporation.

The sterility of the medium having been determined in the usual way, it is inoculated with a fair quantity of the infective agent, pre-ascertained by sub-culture on gelatin and broth to be free from contaminating organisms. Variolous matter as before stated can be easily obtained in a sterile condition. Calf lymph can be freed from the bacteria which it usually contains, by passing a stream of chloroform vapour through it, diluted with four volumes of normal saline solution, as suggested by Dr. A. Green. The simplest apparatus, consisting of a couple of test-tubes suitably arranged, and actuated by a filter pump, will be found sufficient for this purpose.

To ensure successful growth, it is absolutely essential that the infective agents be of undoubted virility.

In these circumstances it will be found, for no very obvious reason, that the growth will not be equally successful in all the inoculated tubes. The measurement of successful growth is indicated by the extent of turbidity, produced in the

medium. Thus, in a tube, in which parasites have multiplied to a moderate extent, the medium will have the appearance of much diluted milk, whereas in a tube where the growth has been abundant, the medium will be as opalescent as laudable pus. It is from the most favourable cultures that sub-cultures should be made. After two sub-cultures, however, it will be found that the reproductive force of the parasites has fallen so low as to be incapable of giving rise to a fresh generation.

The relationship between the symbion and the epizoon of small-pox or vaccinia is not, strictly speaking, comparable with that which exists between, say, the *amœba coli* and a favourable bacterium; for while the latter parasite lives on the bacterium by actually engulfing it, no such inclusion of the symbion by the parasites of small-pox and vaccinia takes place. Any action which the symbion has on them is in the direction of favouring osmosis, the normal method by which the parasites of small-pox and vaccinia obtain their nourishment.

It was hoped that, by the method of symbiotic culture, the tendency of the parasites to die out would be overcome, but by this method a similar result ensued; after a few generations the *amœbæ* were exhausted and incapable of giving rise to a fresh progeny. Nor is this eventuality surprising when it is considered that the normal habitat of these organisms is a living host, in whose tissues they possibly spend a part of their existence as intracellular parasites, as described by Councilman and Magrath under the name of the *Cyrtoryctes Variolæ*.¹ The tendency of these parasites to involution under artificial cultivation is noticeable even in the first culture, and this degeneration becomes more apparent in each successive sub-culture. The *amœbæ* gradually becomes smaller in size, less refringent because the refractile contents become less numerous, while their elemental form, the spore stage, becomes more and more pronounced. It is, in fact, due to the enormous spore formation that the medium becomes turbid.

It must also be indicated that, of the formed elements seen in the cultures, the spores alone are constant, the other forms

¹ *Journal of Medical Research*, February, 1904.

being transitory. It may be thought, owing to the small quantity of the medium employed, that the appearances observed are due to the introduction of the original parasites, but the increased turbidity of a successful culture, the transitional character of the elements, the obvious difference between the progeny and progenitor, the entire disappearance of the original amœbæ from the culture (in the case of the amœbæ of calf lymph, they are easily recognised in the medium), the appearance of forms in a culture such as are not to be found in variolous or vaccine lymphs, and further, the fact that none of these changes will be observed in inoculating the same quantity of the vitreous of the calf or monkey, make it certain that true growth does take place, and that the appearances are not due to a transference of the original virus.

The Temperature.—The optimum temperature for growth on the whole is 37° C., though growth does take place at lower temperatures. The best result is obtained by incubating at blood heat for four or five days, or until the medium becomes milky.

The Life History.—Many points in the life cycle of these parasites remain obscure, by reason of the difficulty of observing and correctly interpreting, change in such minute bodies. The views submitted are therefore of a purely tentative character, and no finality is claimed for them. The observable differences between the parasites, as found in variolous matter and glycerinated calf lymph, are as follows :—

Parasites of Small-pox.

Greater uniformity of size of the amœbæ, with the exception of the encysted forms, which vary in dimensions.

Spores for the most part intracellular.

Parasites of Vaccinia, Glycerinated Calf Lymph.

Parasites vary much in size.

Spores occur abundantly outside of the amœbæ as well as within them.

In cultures the essential point of difference between the parasites of variola and vaccinia is the appearance of what I

have termed the sporocyst (*vide* Diagram A., Fig. 5) in the vaccine culture; these bodies are not met with in variola cultures. Though the life-history of the amoeba variolæ (Diagram B.) is apparently more simple than that of the amoeba vaccinæ, it is probably complicated by the existence of two kinds of amoebæ, a nucleated and a non-nucleated form. It is also more difficult, in the case of variola, to account for the appearance of the large number of extra-cellular spores which are to be found in an optimum culture. Either some of the spores seen inside the parent-cell are of the nature of spores (Diagram B., Fig. 8A), which contain within themselves sporozoites (?), which are so abundantly present in the cultures, or, what is more probable, multiplication by direct division of the spores occurs, as in paramoeba Eilhardi. In the case of the vaccinia cultures, two sets of spores—if, indeed, they both are spores—make their appearance; those liberated by the amoeba itself—the amoeba-spores (Diagram A., Fig. 11), and those liberated by the sporocyst—the cystospores. It is conjectured that the sporocyst is derived from the breaking up of the morula (Photo. No. 5 and Diagram A., Fig. 3) into its constituent hyaline bodies, and that each of these hyaline bodies gives rise to a sporocyst.

In human vaccine lymph, the hyaline body is thought to be inside the amoeba (Diagram A., Fig. 2A), for nothing like a morula body has yet been seen in such lymph, and certain comparatively large homogeneous elements, which evidently differ from the other refringent constituents of the amoeba, are easily observable within the cell.

Nothing like simple transverse cell division has been observed in these parasites.

It follows, from the above and what has been said before, that the end product of the life-cycle of these parasites is the spore, and that this elemental form is probably the only one in which these parasites exist outside a living host apart from artificial conservation; and it is probably through the spores that small-pox is, as supposed by some, aërially conveyed from a focus of infection, such as a small-pox hospital.

The final link in the chain, namely, the reproduction of the disease by means of pure sub-cultures, still remains to be

PLATE XVII.

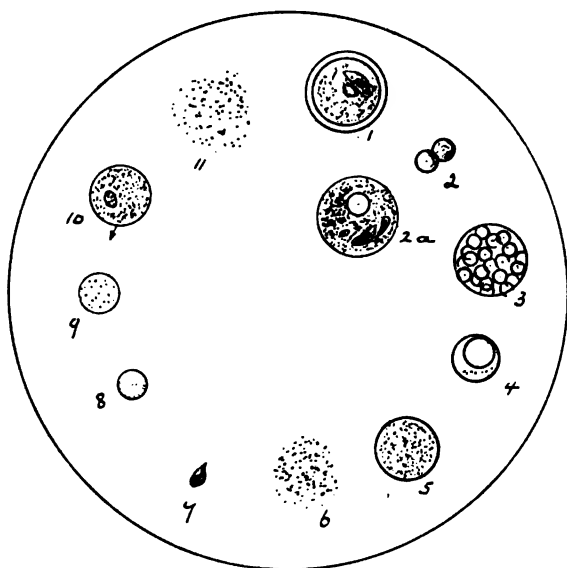


Diagram A.

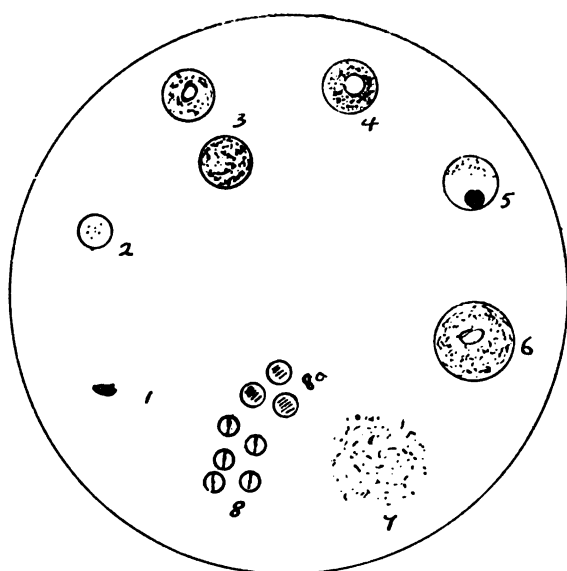
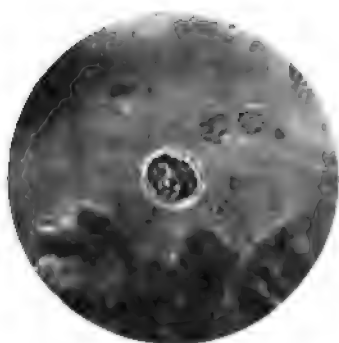
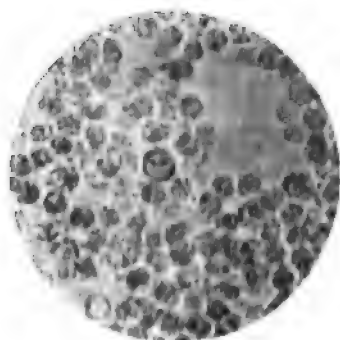


Diagram B.

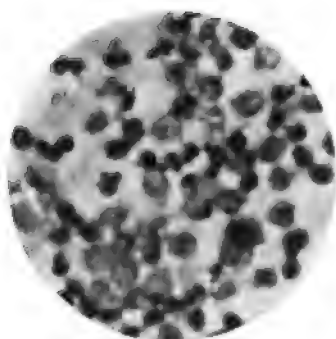
PLATE XVIII.



1.



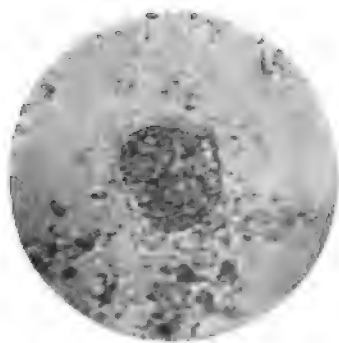
2.



3.



4.



5.



6.

Microphotographs.

effected. In view, however, of the very moderate success thus far attained in the artificial culture of these protozoa, it is considered that the result of inoculation experiments would not be conclusive either one way or the other: this test must, therefore, be postponed until such time as a means for sub-culturing, much beyond the limit I have obtained, shall be devised. Judged, however, by the standard of what constitutes a protozoon, I think that the cultures, presenting, as they do, evidence of sporulation and multiplication, place the parasitic nature of these elements beyond all doubt.¹

I have much pleasure in again acknowledging my indebtedness to Drs. R. T. Hewlett and J. F. Ricketts for their valuable assistance.

Diagrams and Photo-micrographs.—Owing to the motion of the amœba and the spores in hanging-drop preparations of the cultures, which is the only method of examining these bodies, photographic representation is not applicable. All the photo-micrographs have the same magnification, except No. 6, which is much more highly magnified.

Diagram A.—Scheme of life cycle of the amœba vacciniæ.

1. An encysted parasite, showing nuclei and hyaline ectosarc.
2. Hyaline body assumed to be derived from one of the nuclei.
- 2A. Amœba from human vaccine lymph, showing intracellular hyaline bodies.
3. Morula-body.
4. Segment of morula-body giving rise to sporocyst.
5. Sporocyst.
6. Liberation of spores from the sporocyst-cystospores.
7. A single spore.
8. Young amœba derived from 7.
9. Further stage of same.
10. Fully developed amœba.
11. Spores as liberated from 10, amœba-spores.

Diagram B.—Scheme of life cycle of the amœba variolæ.

1. Single spore.
2. Young amœba developed from 1.

¹ "Parasites of Small-pox and Vaccinia," *Lancet*, December 24, 1904.

3. Nucleated and non-nucleated amœbæ.
4. Nucleated amœba.
5. Nucleus of 4 supposed to give rise to an amœba.
6. Fully developed amœba thus derived.
7. Liberated spores.
8. Supposed extra-cellular multiplication of the spores by simple division.
- 8A. Spores supposed to contain sporozoites.

*Photo-micrographs, \times 500 diameters, excepting
No. 6 \times 900 diameters.*

1. Encysted parasite from variolous matter sixth day of eruption, showing hyaline ectosarc.
 2. Field of variolous matter (stained with neutral red), sixth day of eruption, showing one encysted parasite and two forms of amœbæ.
 3. Variolous matter sixth day of eruption, fixed and stained with Leishmann's stain, showing two forms of amœba. (The difference between these cells and leucocytes similarly stained will be observed.)
 4. Glycerinated calf lymph showing two large parasites in the field.
 5. Large morula-body from glycerinated calf lymph.
 6. Spores from vaccinia sub-culture 14 days old. Fixed with perchloride of mercury and stained with aniline-gentian violet for 30 minutes.
-

Prize Essay.

RETENTION OF URINE.

By ALFRED COPEMAN, M.D., M.R.C.S.

THE means to be adopted in the treatment of retention of urine will vary according to the nature of the onset, the age and condition of the patient, and, most important of all, the predisposing cause of attack. In order, therefore, to deal systematically with the subject, it will be best briefly to tabulate the chief factors in the causation of this condition. Retention is said to be obstructive or non-obstructive, according as the condition is the result of—

A.—Some obstruction to outflow, or

B.—The inability of the bladder to expel its contents.

The vast majority of cases come under the first category, which may be subdivided as follows, according to the predisposing cause of attack:—

A.—I. Spasm of the sphincter and unstriated muscle of the urethra, combined with congestion of the mucous membrane, generally arising in the later stages of acute gonorrhœa, chiefly among young adults, as the result of alcoholic or even sexual indulgence, great muscular effort, exposure to cold, &c.

II. Organic stricture, to which has been superadded some amount of spasm and congestion as above, or following unskilful and rough instrumentation. Again occurring chiefly among young adults.

III. Enlarged prostate—the bane of older men.

IV. Abscess or tumour in urethra or its neighbourhood.

V. Pressure of enlarged uterus, specially in incarceration of the retroverted gravid uterus; pelvic tumours, or pressure of foetal head in parturition.

VI. Impacted calculus in urethra and phimosis, occurring chiefly in boys.

VII. Imperforate meatus, or prepuce, and congenital phimosis ; in the new-born.

VIII. Reflex spasm of the sphincter, as the result of operation on perinæum, rectum, anus, testis, cord, &c.

IX. Poisonous doses of certain drugs, as belladonna, inducing spasm of sphincter.

X. Stone in bladder.

XI. Rupture of urethra.

XII. Acute prostatitis.

B.—I. Atony of the bladder, the result of old age or repeated and neglected attacks of retention.

II. Paralysis, from disease or injury of brain or spinal cord.

III. General shock, as the result of any grave operation or injury.

IV. Hysteria—mostly in women.

A.—I. In nearly every case there has probably been some pre-existing organic stricture, of however slight a nature. When gonorrhœa is present, every means at hand must be exhausted before recourse is had to catheterization. Hot baths, belladonna and opium suppositories, Tr. Opii by the mouth, will very likely overcome the congestion and spasm, and allow relief to take place naturally. Should catheterization, however, become necessary, a soft indiarubber catheter of about size 8 or 9 should be used, and if, on reaching the bulb or posterior to it, an obstruction is met with, an olivary catheter should be introduced and very gently pressed forward till the spasm yields, followed, when gonorrhœa is present, by a warm and copious boracic irrigation. Injections of cocaine and adrenalin will be found of great advantage in relieving the tenderness, and reducing the congestion of the mucous membrane.

II. Where there is a history of pre-existing organic stricture, commence by passing a medium-size (say No. 8) gum-elastic catheter, which, even if too large to pass into the bladder, will nevertheless be of much service in diagnosing the nature and position of the obstruction. Failing success, successively smaller sizes with stylets should then be passed, after an injection of cocaine and adrenalin followed by a dram or two

of warm olive oil. If the stricture is still found impermeable, the patient, if young and vigorous, should be placed in a hot bath, and a rectal injection of laudanum given, followed up by still further efforts. In some cases, it may be found possible to pass a fine whalebone filiform bougie, over which a small channelled catheter may be run, or further trial may be made under a general anæsthetic. Very rarely is patience unrewarded in the end, but if there has been much difficulty it is well, after passing the catheter, to tie it in for 24 hours. Silver catheters may have to be used before embarking on sterner measures, but it must always be remembered that, in proportion as their greater rigidity gives more command, so does it increase the danger of their use. Occasionally, all one's efforts are defied, and one is faced with the problem of what to do next. The best of the remaining alternatives is suprapubic aspiration. Strict antiseptic precautions should be taken, a wire passed through the needle to ensure its patency, and the needle then plunged in within an inch of the symphysis pubis, and an inch either side of the middle line, pressure being made on the abdomen with the hand and kept up till the needle has been withdrawn, and the site of puncture covered with collodion. Properly executed, this little operation is perfectly harmless, and can be repeated several times if necessary, but the unloading of the bladder, together with the medicinal measures taken, will generally result in a speedy alleviation of the spasm and congestion, and allow a small sized catheter to be passed shortly afterwards. Should such not be the case, there remains the operation of external urethrotomy, by Cock's or Wheelhouse's method, one great advantage of these operations being that the retention and its cause receive simultaneous treatment.

III. In cases of enlarged prostate, after satisfying oneself by rectal examination of the nature of the case, the surgeon should proceed, if possible, to pass a medium-sized Coudé or Bi-Coudé catheter. Great care must be exercised in making the attempt, owing to the loss of tonicity in the tissues around the bulb, in consequence of which the lower part of that portion of the urethra is inclined to sag. It is important to remember that the curve of the catheter should be at least 1 inch in length, and that, in cases of this kind, the urethra


may have become much elongated, owing to the growth of the gland towards and within the bladder, thus necessitating a longer catheter than those in general use. The straightness of the urethra, too, may be much distorted by the concentric growth of the gland. Silver catheters should, if possible, be avoided, owing to the greatly increased risk of making false passages, in consequence of the condition of the bulbous urethra, and the general want of tone, and inflamed condition of the parts. If only the ordinary straight catheters are available, they should be plunged into hot water, bent to the desired curve, and then placed in cold water to recover their rigidity. In cases where hypertrophied masses of the gland impinge on the vesical orifice, thus resisting all attempts to enter the bladder, a manœuvre which is often found successful is to withdraw the stylet for about $\frac{1}{2}$ to 1 inch from the tip of the catheter, when the latter is inclined to tilt upwards and may then glide over the obstruction. The bladder should be emptied slowly to avoid the possibility of syncope supervening, and a considerable amount should be left behind, to which some warm boric solution may be added. Neglect of this precaution has led to severe hæmorrhage into the kidneys and bladder, and even to death. In taking steps to reduce the accompanying spasm and congestion, it must be remembered that old and feeble subjects should not be placed in hot baths, hot fomentations must suffice, and in view of the possible diseased condition of the kidneys, opium must be used with great caution. In cases where every effort has been unavailing, recourse must be had to suprapubic aspiration, though in the case of old men with long-standing prostatic trouble, the risk of this operation is enormously increased, as the tissues through which the needle has to pass may be infected by the urine, and cellulitis supervene. In such cases urotropin in doses of at least 10 grs. t.d.s., combined with irrigation, will be found of incalculable benefit, and must be pressed till the urine is restored to a healthy condition. If, after one or two aspirations, it is still found impossible to introduce a catheter, recourse had better be had at once to a suprapubic incision, and proper drainage of the bladder established for a while, when the question of the removal of the whole gland may very properly be raised.

More or less the same treatment, with limitations, and of course involving attention to the primary affections, is applicable in other cases of retention, whatever the cause.

A retroflexed and impacted uterus can generally be liberated, and will often relieve itself, after catheterization and rest in bed.

Imperforate meatus or prepuce must be immediately incised.

Retention, the result of paralysis, reflex spasm, poisonous doses of certain drugs, &c., must be approached with the utmost gentleness, and in the case of paralysis especially, with strictest antiseptic precautions. A large soft indiarubber instrument is least likely to excite or increase existing spasm, causes less pain and discomfort, and less hæmorrhage, and, indeed, is least harmful in every way. The wonderful therapeutic value of urotropin, in combination with irrigation of the bladder, when the urine is alkaline and foul, must never be forgotten. In hysterical women, catheterization is above all things to be avoided, if only success can be attained in other ways. In rupture of the urethra, if partial, a catheter must be retained for some days; if total, perineal section at once performed. Finally, in cases of acute prostatitis, withdrawal of the urine by aspiration for a day or two may just turn the scale between suppuration and resolution.



Public Health.

PLAGUE IN INDIA.

By W. J. R. SIMPSON, M.D., F.R.C.P., D.P.H.,
Professor of Hygiene in King's College, London.

SOMETIMES there are matters of public health outside the British Isles which are of special importance to the English people. One of these at the present time is the prevalence of plague in India. Little has been heard of this prevalence, and accordingly few have any conception of the extent of the ravages which the disease is committing in our largest and most important dependency. Several factors appear to have contributed towards this silence on a subject which vitally affects the welfare of the inhabitants of India, and which later may be a serious cause of anxiety to Europe. The South African War, with its exciting incidents, its anxieties, its failures, and its successes, touched too closely the interests of Great Britain for any other subject to secure attention while the struggle lasted. After the close of the war sufficient time for settling down scarcely elapsed before signs of an impending Russo-Japanese conflict began to occupy the public mind. England's alliance with Japan rendered the dispute of special concern to this country. The diplomatic duel was followed with anxiety, and, when war did break out, each stage and event in the campaign was watched with the keenest interest. It was a drama in which science, organisation, devotion, and heroism won victory after victory, both on land and sea, against valour unorganised. The marvellous and unchequered career of success of the Japanese fascinated even the least imaginative, while the danger of complications arising, which might drag in other Powers, necessitated the greatest vigilance. In such circumstances it is not surprising that there was little time for the consideration of other subjects outside those appertaining to domestic affairs. Then, as interest in the war tended to slacken, there were the extraordinary series of events in Russia to attract everyone's attention. Never since the French Revolution has there been

in a country six months of such social and economical disorganisation. Strikes, disturbances, uprisings, and bloodshed have been a matter of everyday occurrence, and law and order seem to have vanished, except when supported by harsh, repressive measures and Cossacks. The contest between the Russian people and the bureaucratic Government has been full of sensational events, none more so than the meteoric career of the mutineer warship the "Potemkin." Every week has brought forth some new outrage, or new development, sufficient to maintain the interest in the situation. The chaotic condition of Russia has not only served to divert public attention from the plague, but if it continues it is likely to play an important part in the spread of the disease.

Indian affairs seldom interest English people. This may be gathered from the fact that the Indian Budget is disposed of every year in the course of a few hours. Only once this year has there been any sign of special interest in the Indian people. Then it needed an earthquake to awaken that interest. The public mind was startled to hear of the violence of an earthquake, which, in addition to the destruction of much property, killed some 20,000 people, half a regiment of Goorkhas, and a few Europeans. Real sympathy was aroused, momentarily, for those who had suffered, and money and kindly feeling flowed into India to relieve the distress. It was, however, an eight days' wonder, and was soon forgotten. The public mind has during the past 18 months been too accustomed to sensations, one after another, to be able to fix its attention for long on any special one.

Possibly, now that there are visible signs of a coming peace and there is no longer the nightmare of complications arising from the war, there may be a chance of the plague in India receiving some attention. Hitherto it has been more or less unheeded, but it nevertheless bids fair to assume such proportions as to enforce attention, however unwillingly this may be given. There are two great questions which concern India to-day, one is army reform, the other is the plague epidemic, and the greater of these is the plague. The need of army reorganisation has been fully realised by the Government, but its importance has come suddenly

to the front—not so much because of the large interests involved, but because of the disagreement between Lord Curzon and Lord Kitchener and the personality of each. In any case time is being taken by the forelock. Discussion and action are not being delayed until the enemy is at the gate. With plague it is different. It has never been fully realised that plague can become even a more terrible and destructive enemy than an army led by the best Russian Generals; it has never been realised that it must be met by a well-organised and trained army, provided with the best and most scientific weapons, and it is only when the ravages of the disease are showing themselves in an appalling mortality, that signs of alarm are beginning to manifest themselves. In a recent leading article in the *Times of India*, headed “The Dying Millions,” it is pointed out that the epidemic of plague in India “is the biggest question in India to-day,” and it is asked “whether Government can do nothing more for the dying millions committed to their care.”

When we read of millions dying it seems to be incredible. But on turning to the figures it is found to be literally true. The plague commenced in India in 1896 and destroyed in 12 months some 30,000 persons. Year by year, except that of 1900, the mortality from the disease gradually increased, and now, during the past two years, it has reached over a million a year. Nearly four million persons have died of plague in India since 1896. The sum of human misery which the figures represent, and the consequences to India which this vast tragedy contains, are almost beyond conception. It needs a good deal of reflection and some imagination to realise the appalling state of affairs. The *Times of India*, already quoted, asks that the epidemic shall be considered by the British public, and the first step that a medical journal can take to carry out this request is to write about it so that the facts may be known. For once the facts are known, there can be no doubt that none will be more responsive than the British. Commenting on the destruction wrought by the earthquake, the *Times of India* says “it counts for naught, besides the tremendous intimation contained in the few words “three million people wiped out by plague in India in two

years." "Place that dread announcement upon the walls of the Mansion House and it might perhaps attract attention. But because the insidious process of decimation is widely scattered, because it is now taking place largely in the dumb precincts of villages, because its incidence is unsensational, except when regarded in bulk, it fails to attract general interest. Yet the plague is the most dominant and insistent factor at work in India to-day, and it has reached a height and intensity which can no longer be accepted without question."

It would be wrong to suppose that the Government of India have not been active in endeavouring to check the ravages of the disease. They have spent large sums of money in the process, and have carried on inoculations on a large scale, but, notwithstanding their efforts, the plague continues to spread. In their earlier attempts to stay the progress of the disease, they unfortunately raised the hostility of the people, and to such an extent, as to be obliged to abandon most of the measures which they had introduced. Probably this was the only course which was thought to be advisable, otherwise disorder and mutiny might have followed. But the policy of leaving things alone, and giving assistance and advice only when asked for, seems to have been the result of a counsel of despair, and has ended in the plague gaining ground by leaps and bounds. Could there have been no alternative to the carrying out of measures absolutely repugnant to the Eastern mind and to the capitulation of the functions of Government in a matter which concerns the very existence of the people? We think that much of the hostility—though we would be far from saying the whole—was due to the untrained agents which the Government had to use in this unexpected crisis, and to the mistakes which were in consequence made. Further than this, it did not require after events to prove that, by the employment of such an agency, the chances of successfully combating plague were of the remotest kind.

Eleven years ago, before the plague was thought of in India, it was shown that the country was unprepared to meet the ordinary epidemics which prevailed. The strength of the sanitary service in India was compared with that in England. The comparison was made in order to show that if the whole of the members of the Indian Medical Service and the whole of

the medical officers of the British army in India were drafted into the Public Health Department of India they would not meet the requirements of the country, or even of the largest province, and that, therefore, India must have a special sanitary service of its own, which, while being supervised and controlled by European medical men from the Indian Services who had specially devoted themselves to public health, ought to be composed in the main of native medical officers, well trained in sanitary science, who might rise by merit to the highest ranks in the service.

When this proposal was made, it was pointed out that in England, with its then 29 million inhabitants, there were over 1,300 Medical Officers of Health for municipalities and sanitary areas, rural and urban, 12 medical officers for counties, and 14 medical inspectors on the Local Government Board ; whereas in Bengal, one of the principal and most advanced provinces in India, which is more than two and a half times the area of England, and contained nearly two and a half times its population, there were 53 Medical Officers of Health, five of whom, viz., the Health Officer for Calcutta and the four Sanitary Commissioners for Bengal, devoted their whole time to sanitary work, while the other 48 were civil surgeons and *ex-officio* health officers, whose time was so occupied with their multifarious and onerous medical duties that it was impossible for them to devote much attention to sanitation. Pursuing the comparison, it was stated that if the province of Bengal were alone provided with the same strength of Medical Officers of Health as England, then, instead of four Sanitary Commissioners, there would be 35, and instead of 53 Health Officers there would be some 3,200. No account was here taken of the army of trained sanitary inspectors in England. It is not to be expected that the high standard of organisation and efficiency in England could be attained in India, but the contrast was sufficient to demonstrate the defenceless state of one province against the invasion of an epidemic, the absence of the possibility of efficient administration in health matters, and the necessity for large and comprehensive changes. What was applicable to this province was applicable to the others, except Madras, where, owing to the foresight of Colonel King, the Sanitary Commissioner, a sanitary service was in

process of formation. This service has since been much augmented. Lately a Sanitary Commissioner has been appointed for the whole of India. This is good so far as it goes, but it is of no use unless followed up by the creation of a proper sanitary service, thoroughly trained for the work it has to do.

As a matter of fact, India has no public health army of defence of adequate size and efficiency to deal with the ordinary epidemics of small-pox, cholera, malarial fever, and other epidemic diseases. In these circumstances, it was absolutely certain that it could not deal with such a disease as plague, and until such an army is created, developed, organised and trained, there is little hope for India.

In the meantime, the plague, in the gigantic proportions it is now assuming in India, is a danger to the world. As such it must be grappled with, and in a manner that will appeal to the sympathies of the Indian people. In this connection it is evident that the Royal College of Physicians fully appreciates the gravity of the situation, for it has adopted a report of one of its committees that the College should address His Majesty's Government on the constantly increasing mortality from plague in India.



FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

THE EDINBURGH MEDICAL SCHOOL.

I.—ITS EARLY DAYS ; THE COLLEGE OF PHYSICIANS ; THE ANATOMICAL SCHOOL.

[With Plates XIX.—XX.]

IN previous papers an account has been given of two of the institutions—the Royal College of Surgeons and the Royal Infirmary—which were foremost in the development of medical teaching in Edinburgh. As a preliminary to surveying the history of the Medical School, it is necessary to relate briefly the rise of the third body, to which, with the two already mentioned, the medical Faculty of the University and the extra-mural school of medicine owe their existence. As will be shown, the teaching of medicine in the University was thrust upon it from without ; the members of the Faculty were College or Town lecturers first, Professors afterwards, and, throughout all their career, the extra-mural school and University have been so closely linked, that it is impossible to dis sever them, even in narrative.

The Royal College of Physicians.—During the 16th and greater part of the 17th centuries the profession of medicine in Edinburgh was in the hands of the Incorporation of Surgeons, but their monopoly did not exclude the practice of the physician's art by the possessors of university degrees. In the surgeon's letters, issued by Mary Queen of Scots in 1567, allusion is made to Doctors of Medicine, and from the context it seems that they ranked more highly than members of the Surgeons' Company. The surgeon-apothecary, in fact, was the ordinary medical attendant of his day ; the physician was a consultant, called in in grave cases only, even such as we should now consider purely surgical. Under the stimulus of the teaching and discourses of Harvey¹ doctors of medicine

¹ Dr. Peel Ritchie (*Early Days of the Royall Colledge of Physittians, Edinburgh, 1899*) believes that each successive attempt to erect a college in Edinburgh may be traced to the indirect influence of Harvey.

no doubt increased in number, and, even before his great work on the circulation (published in 1628) appeared, an attempt was made in 1617 by the physicians of Edinburgh to obtain a charter from James I. A warrant was actually issued to Parliament in 1621, erecting a college of seven physicians, composing a Faculty and Professors of Medicine, empowered to examine and license practitioners and supervise apothecaries. Through the influence of the Bishops, who as Chancellors of the Universities saw their rights infringed, and who suspected that the ecclesiastical views of the physicians were at variance with theirs, this charter came to naught, and a second attempt in 1630, though it got the length of being referred to the Privy Council, was equally fruitless, as indeed is scarcely remarkable, since among other powers the jurisdiction of the physicians was to extend all over Scotland, they alone were to teach medicine within 25 miles of Edinburgh, they were to examine the surgeon-apothecaries, who, moreover, were to be subordinate to the physicians in that they might undertake no operation or cure "which may be deadlie," such as for "woundis of the head, stomach, bellie, bladder, diaphragm, lightes, and liver or great vessels," without the countenance of one of their *soi-disant* professional superiors. A third futile attempt was made in 1657; it was foiled, just as success seemed assured, by the combined efforts of the Surgeons, Town-Council, and apothecaries. The clause stating that medicine "included and comprehended surgery," as well as certain other provisions, created great alarm among the surgeons, and finally Cromwell's death put an end to the whole affair.¹ Not discouraged, however, the physicians kept the project alive, and were in the habit of meeting periodically at Sir Robert Sibbald's house to discuss medical topics and professional politics, until the day when their host proposed, and this time successfully carried through, the scheme of erecting a college. The Surgeons and Apothecaries were then at loggerheads over the question of inspecting shops, hence the occasion was meet for undertaking this duty; the surgeons were conciliated by the absence of any demand for teaching

¹ In this charter right to an unlimited number of anatomical subjects was granted. The text of all these documents will be found in Beilby's *Address delivered at the Opening of the New Hall of the Royal College of Physicians*, Edinburgh, 1847.

rights or anatomical subjects; the Universities and Clergy were disarmed by no claim being laid to granting degrees, and by the undertaking to admit graduates to the College licence; while a charter limiting the right of supervising medical practice to the neighbourhood of Edinburgh called forth no opposition from bodies in distant parts of the kingdom. Through Sibbald's influence with the Earl of Perth, and his friendship with Sir William Scarborough, physician to the Duke of York, and, scarcely less, through his own forceful personality, the Charter was signed and sealed on November 29th, 1681—St. Andrew's Day. One curious touch in Sibbald's Autobiography is worth quoting. He had found a copy of the abortive Charter signed by James I. in 1621 (it had been obtained by his uncle, Dr. George Sibbald), and "produced this to His Royal Highness, who, as soon as he saw it subscribed by King James, said with much satisfaction 'he knew his grandfather's hand and he would see our business done,' and from that moment acted vigorously for us."

While it is not our intention to chronicle the history of the College of Physicians, but to describe the steps by which Edinburgh became a great medical school; in doing so some of the work of the new corporation will incidentally appear. Though jealous of their privileges (as the disputes with the surgeons and Town Council, which were not slow in arising, show), the College has throughout its career taken a broad-minded view of its duties to the community, and the comparatively restricted nature of its chartered rights, has in reality been no obstacle to the carrying out of good works—nay, it has rather been a blessing in disguise, for the College, having few privileges to assert or defend, has sought other and less selfish outlets for its energy.

The Beginnings of the Medical School: Botany and Physic.—Up to nearly the end of the 17th century, medical education in Edinburgh practically consisted in apprenticeship to a member of the company of barber-surgeons, and the portal of the profession was the examination for entrance into that incorporation. No knowledge of the nature of this test has come down to us; we gather that anatomy was taught, though but to the limited extent which the heritage of one subject annually allowed. There was no medical faculty

in the University,¹ and the low esteem in which Scottish physicians were held during the 16th century is proved by the preference shown by the nobility for foreigners—the well-known visit of Jerome Cardan at once rises to mind as an instance of this. In the reign of James VI., however, both the physicians and surgeons to the Court were native-born, though possessed of foreign degrees.

In the latter quarter of the 17th century, a small group of brilliant physicians—Andrew Balfour, Burnett, Archibald Stevenson, Pitcairn, and their leader, Sir Robert Sibbald—had made Edinburgh their home. Imbued with the ideas of medical teaching gained in foreign schools, the desire to realise them in the Motherland came naturally, and Sibbald, aided by Balfour, got the use of a piece of ground some 40 feet square, near Holyrood, entrusted its culture to one James Sutherland, and proceeded to stock it as a botanical garden; they soon had between 800 and 900 plants from Scotland and abroad. This must have been shortly after 1670, and the venture, aided by subscriptions from the physicians, prospered to such an extent that a larger piece of ground² was soon obtained from the town, and a grant from the Exchequer was procured. Sibbald and Balfour were appointed visitors, and Sutherland curator. In 1676 Sutherland was recognised by the town as botanist, and paid a salary of £20 per annum; he was provided with a room in the University, in which to store his books and seeds; and 19 years later, in 1695, was formally appointed Professor of Botany. The early history of the Botanical Chair is interesting as showing the intimate relation between extra- and intra-mural teaching in those days. At first Sutherland was employed by the physicians, and even after becoming a titular professor, the instruction of surgeons' apprentices was his chief work. When the surgeons, in 1695, procured the patent extending their jurisdiction,

¹ During the sixteenth and seventeenth centuries Aberdeen University had professors of medicine but few graduates; in Glasgow, for practical purposes, there was no medical faculty, while the first medical degrees were conferred in St. Andrews in 1696. Gairdner, *Sketch of the Early History of the Medical Profession in Edinburgh*. Edinburgh, 1864.

² East of the North Bridge, on the site of the present Waverley Station. Under Professor Hope the Physic Garden was removed in 1776 to the west side of Leith Walk, and in 1820 the present garden was opened by Professor Graham.

Sutherland induced them to tax each apprentice one guinea for instruction in botany. He acknowledged the Incorporation as his superiors, and promised to attend them in the Physic garden whenever they desired it. Having attained his object of gathering a golden harvest from the students, Sutherland seems to have relaxed his efforts, for in 1705 the deacon of the surgeons had to complain to the Town Council of his remissness in teaching, and the prompt reduction of his salary from £20 to £5 brought about his resignation. The Professor of Botany, in addition to having charge of the physic garden, had under his care the College "yard" or garden, for Sutherland's neglect of this also was the subject of complaint by the University authorities. He was succeeded by Charles Preston, who, Gairdner notes, applied for the patronage of the college six months before he was actually made a professor in 1706. Preston held office until his death, and was succeeded in 1712 by George Preston, a surgeon who had settled in Edinburgh some years previously, and, having seen service abroad, was appointed Surgeon-Major to the Forces in North Britain.¹ Notwithstanding that Sutherland and the Prestons were the first Professors of Botany in the University, and therefore the forerunners of the medical faculty, the posts were largely honorary so far as University duties were concerned, their chief work lying among non-matriculated students.

We have seen that the College of Physicians was instrumental in founding the physic garden; its object is easily seen. Not only were the physicians desirous of having apprentices properly taught, but they wished to bring their duty of supervising drug-shops to a practical outcome by enabling the apothecaries to obtain pure drugs and simples, and, as a means of enforcing a standard of purity, they set about the preparation of a pharmacopœia, that of the London College not being binding north of Berwick. The prepara-

¹ His advertisement in the *Edinburgh Gazette*, October 9, 1701, well illustrates the manner of business of an apothecary of the time, however little it accords with our idea of the dignity of a professor and the holder of an important position in the army:—"George Preston, apothecary and druggist, is newly arrived with a large parcel of all sorts of druggs newly come from the Indies; as also, all sorts of spices, sugars, tea, coffee, chacolet, &c., and are to be sold at his shop in Smith's New Land, on the north side of the High Street, foregainst the head of Blackfriar's Wynd, Edinburgh. Printed lists, with their prices, are to be seen at his shop."

tion of this work occupied much of the time of the first Fellows of the College from 1682 to 1699, when the first edition appeared. The book, revised as occasion required, held its position as the Scottish standard until the issue of the British Pharmacopœia in 1864.

As has already been stated, the opposition of the Universities to the erection of a college of physicians was obviated by the insertion into the charter of a clause safeguarding the universities' rights, and in particular debarring the new corporation from teaching or granting degrees. The result of the understanding between the parties was soon to be manifest, for in 1685 the Town Council appointed three of the leading physicians Professors of Medicine—Sir Robert Sibbald, James Halkett, and Archibald Pitcairn. In thus foreshadowing the Faculty of Medicine, the town prescribed no duties and paid no salaries; they gave rooms in the College to the new professors, and apparently left them to their own devices—to teach or not, as each one listed. As a matter of fact, it is doubtful whether any of them ever lectured. Pitcairn did not (he was called to a chair in Leyden), Halkett did not, and Sibbald's principal effort seems to have been to advertise, in classic Latin, in the *Edinburgh Courant*, 21 years after his appointment, his willingness to teach natural history and medicine to students, provided they knew Latin and Greek, philosophy, and the fundamental parts of mathematics. This, so far as is known, his only attempt at lecturing, may have been occasioned by the death of Preston, the botanist, and may have been intended to keep up a semblance of continuity of lectures pending the filling up of the vacancy. In justice to Sibbald, however, it should be mentioned that, shortly after his appointment, he adopted the faith of Rome, and was therefore debarred by the Tests from accepting office until his reconversion to Protestantism some years later.

So much, then, for what Grant calls the "dawn of the faculty of medicine"; it remained for the College of Surgeons to carry on the good work and bring it to full fruition.

*The Anatomical School.*¹—Archibald Pitcairn returned to

¹ For much of the following we are indebted to Professor Struthers' erudite *Historical Sketch of the Edinburgh Anatomical School*, Edinburgh, 1867.

Edinburgh in 1693, and, inspired by the wish "to make better improvements in anatomy than have been made in Leyden these thirty years," he, in 1694, incited Monteith, a member of the Incorporation of Surgeons, to apply to the town for bodies for dissection. He was granted the "bodies that dye in the Correction house" and "the bodies of fundlings that dye upon the breast." As a place for carrying on his studies, he was granted "any waste room in the Correction House," the conditions attaching to the grant being that dissections should only be carried on in the winter, and that the "gross intestines" were to be buried within 48 hours. The surgeons, hitherto content with their conservative practice of two centuries—the occasional dissection of the body of an executed criminal—were roused to activity by this, and they also asked for, and obtained, more anatomical subjects, with, however, the important proviso, that they must build an anatomical theatre before Michaelmas 1697. It is quite obvious that since the only students were the surgeons' apprentices, Monteith's scheme could not hope to outbid that of the incorporation; accordingly it is not surprising to learn that he gave it up, and in 1697 began to teach chemistry at Surgeons' Hall. As soon as their grant came into force, on the completion of their theatre, the surgeons chose certain of their members as "operators" to conduct dissections,¹ but in 1705, it being rumoured that a stranger intended to apply to the Town Council for the use of the theatre to teach anatomy in, they altered their system,

¹ One of these early courses of anatomy is thus recorded:—The first day, James Hamilton—A discourse on anatomy in general, with a dissection and demonstration of the common teguments and muscles of the abdomen. The second day, John Mirrie—The umbilicus, peritoneum, stomach, pancreas, intestines, vasa lactea, mesentery, receptaculum chyli, and ductus thoracicus. The third day, Mr. Alexander Nisbet—The liver, vesica fellea, with their vessels, spleen, kidneys, glandulæ renales, ureters, and bladder. The fourth day, George Dundas—The organs of generation in a woman, with a discourse of hernia. The fifth day, Robert Swintoun—The containing and contained parts of the thorax, with the circulation of the blood and respiration. The sixth day, Henry Hamilton—The hair, teguments, dura and pia mater, cerebrum, cerebellum, medulla oblongata, and nerves within the head. The seventh day, Robert Elliot—The five external senses, with a demonstration of their several organs. The eighth day, John Jossey—The muscles of the neck and arm, with a discourse on muscular motion. The ninth day, Walter Pott—The muscles of the back, thigh, and leg. The epilogue or conclusion by Dr. Archibald Pitcairn. (*Surgeons' Records*, May 18, 1704.)

PLATE XIX.



Royal College of Physicians (Edinburgh).



Exterior of New University (Edinburgh).

PLATE XX.



New University Quadrangle (Edinburgh).



McEwan Hall (Edinburgh).

and (partly from "a desire to prevent extraneous hands from meddling in their matters") specially appointed one of their number, Robert Elliot, Dissector of Anatomy. Six months after having secured this office, Elliot sought encouragement from the Town Council, and was made Professor of Anatomy in the University at a salary of £15, in the same informal way as Sutherland and the Prestons had been elected to the Botany chair. Three years later Drummond was made co-professor with Elliot, and on the death of the latter, in 1716, McGill was elected as his successor. In 1720 McGill and Drummond resigned in favour of Alexander Monro, whose tenure of the chair was in 1722 made permanent—*aut vitam aut culpam*—a wise step due to the sagacity of Lord Provost Drummond, and one which created a precedent never afterwards departed from.

A word or two of biography may be allowed us here, for Monro, true to the tradition in which he had been brought up, was the life and soul of the medical school. He was the son of an army surgeon of good professional and social standing, who conceived the idea of making Edinburgh a teaching centre, and educated his son to be the instrument. The boy studied anatomy under Cheselden, made a tour in Paris and Leyden, where he fell under the influence of Boerhaave, and returned to Edinburgh, when 22, to accept a chair. All was in his favour; his inaugural lecture was attended by the Lord Provost, the Presidents and Fellows of the two colleges, and other notabilities, the sight of whom so perturbed the lad that he forgot the set address prepared, and was driven to speak *ex tempore*, acquitting himself so much to his own satisfaction that he henceforward adhered to the method of lecturing, then involuntarily adopted. Monro's lectures were well attended, the average annual number of students during his first decennium being 67, during his third, 147. He dealt with human and comparative anatomy, pathology, and operative surgery; bandages and appliances came within his sphere, and he concluded with some lectures on physiology. He lectured for 38 years, and after resigning at the age of 60, gave the last nine years of his life to practice, and taught as a professor of clinical medicine. During his tenure of the chair, the cry of body-snatching

arose ; Greyfriars churchyard had been violated, and the mob threatened to wreck the Surgeons' Hall. Monro therefore petitioned for a theatre within the University, which was allotted to him in 1725, and in 1736 had a dissecting-room added to it. His activities were not, however, restricted to his professorial work : the part he took in the building of the Royal Infirmary, and his appointment as surgeon to that institution, have been referred to in a previous paper ; he lectured, but was not an operating surgeon. He wrote voluminously—on anatomy, surgery, physiology, medicine, and midwifery ; he founded a medical society which was ultimately incorporated as the Royal Society of Edinburgh. Anatomist, surgeon, physician ; lovable and modest in his private relations ; kindly and benevolent to his students ; the intimate of all the influential men of his time ; he passed away in 1767—the father of the Edinburgh school.

The Medical Faculty of the University.—During Monro's lifetime the medical faculty definitely came into being. It dates from 1726, the date on which he removed his theatre from the college of surgeons. The early professors of botany, who lectured, and the early professors of medicine, who did not, had no definite standing, and were not members of the Senatus. From 1705, at least, candidates for the degree of M.D. were examined, at the request of the University, by the College of Physicians, but in 1725 the University, in thanking the College for their past assistance, announced that there were now enough Professors to form a Faculty, which henceforth proposed to add to the work of teaching the duty of examining its students.

In following up the progress of the new faculty, which henceforward was the centre of gravity of the medical school, we shall constantly see how each new departure in teaching resulted from external forces, often in the face of the most determined opposition by the more stable and coherent body to the disturbance of its equilibrium which fresh accretions to its mass involved. Illustration of this is seen in the further history of the teaching of anatomy and the kindred subjects.

Monro *primus* was assisted by his son, who was appointed colleague to his father while yet an undergraduate. He studied abroad in Paris, Leyden, and Berlin, being more

influenced, perhaps, by Meckel, than by any other teacher. His lectures were immensely popular, and during the half-century that he taught anatomy and surgery, his class was attended by 14,000 students. At the same time he was in active practice; Gregory describes him as an ideal practical physician and consultant; no greater evidence of his reputation can be given than the fact that he was a recognised leader—*primus inter pares*—of contemporaries such as Cullen, Joseph Black, Gregory, Rutherford, and Hope. In 1798, his son, *Monro tertius*, was made conjoint professor, and, after 1808, lectured alone. He retired in 1846, and was followed by Goodsir, whose successor, Sir William Turner, now reigns as Principal of the University. From 1720 to 1903, the professors of anatomy were but five, and, of these 183 years, the Monros held the chair for 126—surely a unique record.

Extra-Mural Anatomists.—For almost a century after the institution of systematic anatomical teaching, the Monros and their predecessors were without rivals. Neither *Monro primus* nor *Monro secundus*, however, was an operating surgeon, and in 1786 John Bell, impressed by the necessity for more practical instruction than was conveyed in the demonstrations of which *Monro's* course largely consisted—"unless there be a fortunate succession of bloody murders, not three subjects are dissected in a year"—got the use of the surgeons' theatre for the purpose of giving lectures on surgery and midwifery. In 1790, he built an anatomical school for himself, and shortly thereafter enlisted the services of his more famous younger brother Charles, John taking the surgical part of the course, Charles the anatomical. John Bell's thesis, that surgery must be based on anatomy and pathology, led him into bitter feud with Gregory, Professor of the Practice of Physic, and Benjamin Bell, the surgeon. The controversy had various ramifications, which it would be profitless to follow, but one part of it was involved in the litigation between the College of Surgeons and the managers of the Infirmary concerning the Surgeon's right to act on the staff. The triumph of Gregory and the managers in 1800, excluded Bell from a post on the rearranged staff, whereupon he retired from teaching and devoted himself to practice, in which he obtained a great reputation as a consulting and operating surgeon. Charles, however, conducted

the class for another three years, and then he too gave up struggling against the clique who were in power : having seen the chair of anatomy filled by the appointment of *Monro tertius*, and having been passed over for two chairs of surgery, he settled in London in 1804. His career there—seven years of obscurity in which his greatest work was done, the Hunterian School in Windmill Street, his friendship with Abernethy, his teaching at the Middlesex Hospital—need but be mentioned. In 1835 he accepted the Chair of Surgery in Edinburgh, saying “London is a place to live in, but not to die in.” Revered by continental *savants* as a greater than Harvey, the prophet met with little honour in his own country, though for this, blind chance rather than wilful negligence was to blame. His long absence from Edinburgh, the bad effect which the decadence of the anatomical department under *Monro tertius* had on the rest of the medical classes, and a comparative failure to attain that success in practice which he had looked for, prevented him from realising the dream of a collegiate life, free from financial cares and devoted to science. “Here,” he wrote, “I seem to walk in a city of tombs.” And not so long before he had heard Roux say, as he dismissed his class without a lecture, “C’est assez, Messieurs, vous avez vu Charles Bell.”

Less known than the Bells, but an anatomist of repute in his time, was Barclay, Syme’s teacher, who lectured from 1797 to 1825. He was *Monro’s* sole rival, and as the number of students in Edinburgh increased during his time from 600 to 900 he always had a large extra-mural class. He was the first pure anatomist in Edinburgh, a circumstance which doubtless contributed to his success. At this period, on account of the difficulty of obtaining subjects, dissection was neither compulsory nor general : most of Barclay’s material came from St. Thomas’s Hospital, through the intermediary of the porter of that school, who found it to his profit to alter the destination of subjects delivered to him, until the practice was discovered by the dearth of bodies. It is impossible to mention all the anatomical teachers of Edinburgh : they increased greatly in number during the first quarter of last century, owing to the inefficiency of *Monro*, under whom the matriculated students fell to 330. Chief among them was Knox, a most stimulating

exponent of his subject, whose *forte* was to explain human, in the light of comparative, anatomy. His name is too often remembered solely from his innocent association with the notorious murderers Burke and Hare. In his own generation his fame was such that his class exceeded in numbers that of the second Monro.

As a reason for dealing at this length with the rise of anatomical teaching in Edinburgh, it may be pleaded that the subject covered a larger part of the curriculum than is now the case. The anatomists taught surgery and physiology, and, though to a less extent, other branches of medical science. While in the University, differentiation took place at definite periods, as new chairs were created, in the extra-mural school, it was not until the College of Surgeons in 1829 refused to recognise a teacher in more than two departments, that any check was put on the practice, and, up to 1838, any other branch of study might be conjoined with anatomy.

(To be Continued.)



Notes by the Way:

**British Medical
Association.**

MR. FRANKLIN in his Presidential address at the recent annual meeting of the British Medical Association touched on many things and illuminated everything that he touched. Only one or two points need be referred to here. He asks whether, when one contemplates for a moment the subdivisions of work that are undertaken by the specialist, the general practitioner will, as such, continue to exist. In regard to specialism, the President seems to have set out with the intention of cursing it, and to have ended with a blessing. To our mind, it is not the general practitioner, but the general physician that is threatened with extinction. When the general practitioner shall have been educated up to the degree Mr. Franklin wishes him to be, he will have little need—unless it be for his own protection in obscure cases—of the counsel of an all-round physician. The surgeon, the obstetrician and gynaecologist, and specialists of various kinds, we must always have with us. The causes to which the President attributes the development of specialism—competition and the demand of the public—are at best only secondary causes. The true cause is the extraordinary development that has taken place in medical science during the last thirty or forty years, and the limitations of the powers of the human mind. No man, however gifted or industrious, can hope to keep pace with progress, except along some particular line. Charlatanism lies not in specialism, but in the pretence of universalism. Whether he likes it or not, a physician cannot nowadays be encyclopædic. As knowledge grows, specialism must necessarily increase. Nothing but greater efficiency can come of this, provided a broad and solid groundwork of professional education precedes specialisation. The best specialists are the men who, having become proficient as general practitioners, subsequently devote themselves to the special study of some particular branch of Medical or Surgical Science.

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The Address in
Medicine.

DR. MAUDSLEY'S address was not only admirably expressed but eminently suggestive. He raised several questions of the highest importance to which attention might profitably be given by the rising generation of pathologists. The variations of morbid heredity offer a field of inquiry likely to be fruitful of new truths of deep concern to the race. He uttered a note of warning as to the danger of exaggeration in regard to the curability of tuberculosis. But he is rather disposed to underrate the beneficial effects of sanatorium treatment. Here we are only beginning to grapple with the problem, and it is open to any one to say with Dr. Maudsley that trustworthy statistics are not available for this country. But with the record of what has been done in Germany before us, it is surely impossible to believe that sanatoria have achieved nothing more than was effected by "sensible treatment" before they were heard of. With Dr. Maudsley's appeal to the profession to make a larger use of the resources of the mind in the treatment of bodily disease, we are in entire sympathy. It is from neglect of psychical agencies in treatment that practitioners often have the mortification of seeing patients, whom they have treated by the most approved scientific methods without success, cured by hypnotists and Christian Scientists. Charcot used to send patients, whose cases were suitable, and who had the necessary amount of faith, to Lourdes, and the results were frequently satisfactory. Why should the vast field of mental medication be left wholly to quacks? On the question of "eugenics," which may be defined as the science of breeding superior persons, Dr. Maudsley has much that is enlightening to say. He does not allow himself to be carried away by Mr. Galton's enthusiasm, for he sees clearly that, between the breeding of a race horse and the breeding of a genius, there is an infinite distance. You may—though in view of the failure of Frederick the Great's father to "propagate procerity," even this is not certain—breed physical excellence. It by no means follows, however, that "strains" of mental endowment can be produced in the same way. Genius is a "sport" that no scientific breeding can produce. How many of those who have won fame in literature, art,

politics, and even war, have been men of poor physique and unhealthy constitution?

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**Honour to whom
Honour is due.** THE British Medical Association has honoured itself in honouring Sir Constantine Holman, though the recognition of his services has come rather late in the day. The bestowal upon Sir Constantine of the gold medal for distinguished merit is a gratifying proof that the rulers of the Association appreciate his lifelong labours for the reform of abuses, the efficient administration of medical charities, the relief of distress, and the improvement of the great public school which we are proud to claim, in an especial manner as a creation of the medical profession. To Sir Constantine Holman, Epsom, in great measure, owes its present position, and it was fitting that the self-sacrificing work, which for so many years he has given to the furtherance of its interests, should have been commemorated in the Holman Art and Reading Room. But, after all, his best monument is Epsom College.

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**The Physician of
the Future.** IT may be interesting to compare with the views of the President of the British Medical Association, those expressed a few weeks earlier by Dr. H. W. Wiley. In an address delivered before the graduating class of the Medical and Dental Schools of the Columbia University, he said that, if we look at the practitioners of the present day, we find three classes which have been founded as a result of rationalism in medicine. First, there is the general practitioner, who of necessity must be brought in contact with all forms of human ills; secondly, the specialist, "who happily lives in a community where the physician who devotes his whole time to one particular study can be supported"; thirdly, the health officer, who is the forerunner of the physician of the future. It may be well to explain that, in America, the term "physician" is used as *médecin* is in French and *Arzt* in Germany, as a generic designation for practitioners of the art of healing. It may be said, by the way, that it would be a great convenience if

we had some equivalent term in English other than "doctor," which, used in that particular sense, is almost slang. The practitioner of the future will, according to Dr. Wiley, be the herald and exponent of prophylaxis. The medical profession will be paid, not in proportion to the amount of sickness which prevails, but in proportion to the degree of health which is maintained. "That physician will have the largest compensation whose parish is freest from disease." The practitioner will become the teacher of the principles of public hygiene in schools, colleges, and hospitals; he will become largely a public officer, and will, therefore, take a larger share in the conduct of public affairs. Apart from the prevention of disease in the community, Dr. Wiley holds that the medical profession of the future will "find its best exponent in the service of senectitude." As he puts it, "an old age without illness or dementation, a ripening without decay, a completion of the functional activity without the breaking down of any organ, are steps towards which the medical profession of the future may well direct its energies." The aim of the doctor of the future will, therefore, be to make the human constitution like the "one hoss shay," which was—

Built in such a logical way
It ran a hundred years to a day,

and then went to pieces all at once. There will be no disease, only as time goes on a wearing out with—

A general flavour of mild decay,
But nothing local, as one may say.

If this ideal is to be reached, the physician of the future must possess a control over disease, and the multitudinous agencies that produce it, undreamt of in our philosophy.

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The Right to
Longevity.

IN his address to the Public Health Congress, Sir James Crichton-Browne contended that "every man has a right to live one hundred years." It may with equal truth be argued that he has a "right" to live a thousand. If it be granted that he has the right, how is it that he so seldom uses that right? The answer must, we fear, be that he cannot. In the Crimean War, an Irish soldier cried out to his captain that he had

captured a prisoner. The captain replied, "Bring him in, then." To which came the answer, "I can't, Sir! He won't let me!" In the same way, Nature will not allow most of us to exercise our "right" to live a hundred years. The late Sir Benjamin Ward Richardson, who taught the same doctrine as Sir James Crichton-Browne, did not reach the comparatively short limit laid down in the Bible, for he died at 68. Richardson was one of the prophets of hygiene; his failure, therefore, cannot be attributed to ignorance, still less to the breaking of laws of which he was so earnest an expounder. The truth seems to be that, although a man can do a great deal to shorten his days in the land, he can do but little to lengthen them. He may indeed, if he models his way of life on that of a cabbage, vegetate a little longer than if he plays his part on the stage of human life. By living wholly for himself, and thinking of nothing but his health, he may keep off death for a little time. But is not such a life a living death? And how many are there that can so order their existence as to shut out everything that threatens their bodily well-being? We need scarcely say that we are far from depreciating the reasonable care of the body. We venture to think, however, that to set before people, from their earliest days, a century of life as the chief thing to be aimed at, will do little to help them to attain that ideal, and may do much to make their lives less beautiful and less useful than they otherwise might be. It is a teaching that is too likely to make men *propter vitam vivendi perdere causas*.

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**The Latest
Cancer Cure.**

FEW of those who have followed, even with a lukewarm interest, the various phases of the inquiry as to the value of M. Doyen's treatment of cancer, can have been surprised by the report of the Committee appointed by the Paris Société de Chirurgie. The report, which has every appearance of being based on a painstaking and conscientious investigation, states that it is the unanimous opinion of the Committee that nothing, which they observed, affords any reason to believe that M. Doyen's treatment has a favourable action on cancer. In plain language, the vaunted serum is a failure. The Committee

complain that a good deal of embarrassment was caused them by M. Doyen's peculiar ways of explaining away awkward facts. Naturally, he does not accept their verdict. But when he chooses a newspaper as the medium for replying to his critics, he seems to us to depart from the laws and customs of professional discussion. To accuse them of ignorance and prejudice is not only undignified but inconclusive. Scientific discussions conducted in this tone certainly do not tend to raise the medical profession in the esteem of the public. Nor are flat contradictions about plain matters of fact calculated to inspire confidence in the results of scientific research.

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WE very much regret that, owing to an oversight on the part of the printer, the result of the June competition was not inserted in our August number. The best essay was sent by Dr. A. W. Copeman, of St. Mary Axe, London, and the best answers to questions by Mr. Norman G. Harry, M.B., of Evesham. Cheques were sent to these gentlemen in the ordinary course.

The result of the July competition is as follows:—The best essay was sent by Dr. Stanley B. Atkinson, of Adelphi Terrace, London; and the best answers to questions by Dr. D. F. Barry, of Birkenhead. Cheques have accordingly been despatched to these gentlemen.



Practical Notes.

THE PHYSIOLOGY OF THE DIGESTIVE PROCESS—
ABSORPTION OF FOOD.—The reason why food is digested in the mouth, stomach, and intestine, is that it may be more readily absorbed, and so actually get into and become part of the tissues of the body. From the thick nature of the epithelium of the mouth, pharynx, and cesophagus, it is obvious that very little absorption of digested food takes place in these organs, but very soluble substances are absorbed by the wall of the stomach. In cases of stenosis of the pylorus, either from simple or malignant stricture, which prevents the passage of food into the duodenum, small quantities of soluble material pass through the mucous membrane of the stomach, and so get into the blood and the lymph stream. On the valvulæ conniventes of the small intestine are found the villi, which are covered with a columnar epithelium, the free border of which is striated. These villi increase the surface for absorption to take place; at the same time they are covered with a single layer of cells, so that digested food may more readily pass through their surface. In the large intestine, where villi are absent, absorption does occur, though to a much less extent. Absorption depends upon two main factors, namely, (1) the physiological activity of the columnar epithelial cells covering the villi and the cells in the lymphoid tissue beneath the surface; that is, they must be free from disease, and capable of performing their normal functions; (2) the physical process of osmosis; that is, the smaller the molecule to be absorbed the more readily will it pass in solution through the free striated border of the columnar cells lining the mucous membrane of the alimentary canal. In other words the food must be thoroughly digested before it can be absorbed. We have noted previously that the ultimate product of the digestion of carbohydrate material in the alimentary canal is glucose ($C_6H_{12}O_6$), either dextrose, levulose, or galactose. The glucose passes through the epithelium on the free surface of the villi, and gets into the portal vein radicals, whence it is taken to the liver, where

it is stored in the cells as glycogen ($C_6H_{10}O_5$)_n, the chief reserve of carbohydrate material in the body, and it corresponds to the starch which is stored up in the tubers and roots of plants. No other sugar, but glucose, is utilised by the liver cells to form glycogen.

Proteids in solution are absorbed by the mucous membrane of the stomach, especially if there is stenosis at the pylorus, and they are also absorbed from the wall of the large intestine. This naturally occurs in patients who are fed *per rectum* on nutrient enemata which contain previously peptonised material. Most proteid material, however, is absorbed by the villi as peptone, but during absorption the small molecule peptone is reconstructed by the columnar cells and converted into native proteids, such as serum-albumen, and serum-globulin, which are found in the blood stream. A small amount of the absorbed peptone occurs in the chyle, as serum-albumen and serum-globulin. It is suggested by some physiologists, that peptone in the alimentary canal is further broken up into simpler amino-compounds, such as leucine, tyrosine, aspartic acid, ammonium compounds, and the hexone bases, by the action of the trypsin from the pancreatic juice, and the erepsin from the succus entericus, and that it is these amino-compounds which are absorbed by the villi, and that they are, during absorption, resynthesised into serum-albumen and serum-globulin. Fat, during digestion, is first emulsified and then saponified. The view formerly held, was that the emulsified fat passed through the bile-covered epithelium of the villi, and was taken by the amoeboid cells of the lymphoid tissue into the central lacteal radical which contains the chyle. Munk, however, showed that, as a rule, fat in the alimentary canal is completely saponified, or, at any rate, is converted into glycerine and fatty acid, when the latter is dissolved in the bile salts, and hence is readily absorbed with the glycerine. The columnar cells over the villi now cause synthesis to take place; the fatty acid combines with the glycerine to form fat once more in the columnar cells. The amoeboid cells of the lymphoid tissue now carry the fat particles through the retiform tissue of the villi, and they deposit the minute fat particles in the central lacteal. The presence of bile, no doubt, aids the absorption of fat,

for in cases of obstructive jaundice, where bile is absent from the alimentary canal, fat is not completely digested, and moreover is not absorbed. It, therefore, passes out of the body in the fæces, from which it can be readily extracted with ether.

Soluble salts, such as sodium chloride and water, are readily absorbed along the alimentary canal unchanged. It must ever be kept in mind that probably the most important factor in the absorption of digested food is the action of the columnar cells lining the alimentary canal, and whenever these cells are diseased, as occurs in lardaceous disease of the mucous membrane of the intestine, or in Cholera Asiatica, in which disease the comma spirochæte of Koch is found in the lumen and in the wall of the intestine; the columnar cells are diseased, exfoliate, and absorption of digested food fails to take place. There is consequently found in the stools, not only the dead columnar cells, but also albumen, and a large quantity of sodium chloride, material which, doubtless, has not been absorbed, or has passed back into the lumen of the alimentary canal.

Micro-organisms, as is well known, enter the body by way of the alimentary canal. Tubercle bacilli enter through carious teeth, the mucous membrane over the tonsils, and probably also through the mucous membrane of the intestine. Typhoid bacilli enter through the wall of the small and large intestine. The *Streptothrix actinomyces* enters by the mouth, especially if there are carious teeth. The embryos of many of the worms enter the body by the alimentary canal. Apart from these, however, it is now believed that many poisons which get into the body and produce diseases, such as pernicious anæmia, malignant endocarditis, acute polyarticular osteo-arthritis, acute infective osteomyelitis, enter by and become absorbed from lesions in the alimentary canal, such as carious teeth, chronic ulceration of the stomach, ulcers in the vermiform appendix and ulcers in the rectum and about the anus.

“SORE EYES.”—The condition, popularly known as sore eyes, is, in most cases, a chronic inflammatory state of the lids especially involving the ciliary margins, and known as *chronic ciliary blepharitis* or *tinea tarsi*. There are two classes of cases, namely, *Blepharitis squamosa* and *Blepharitis ulcerosa*.

Blepharitis squamosa is characterised by redness of the lid margins with slight swelling and a fine branny desquamation amongst the eyelashes. Occasionally there are yellowish fatty crusts, which are due to inspissation of the increased secretion from the glands found in this region. This condition may occur at any age, and in all stations of life, but, as a rule, it is more marked amongst the poorer classes, and especially amongst children, who are ill cared for. Blepharitis ulcerosa is a more advanced condition than the former, the lid margins being much more swollen. The scales and crusts are present as described above, but beneath the crusts there are small ulcers, and if the scales are pulled off, the ulcers bleed. The hair follicles of the lids are usually diseased. The lashes are consequently ill-formed, grow irregularly, and are frequently stunted, and easily come out. If the condition persists untreated, the redness and swelling increase, the lower lid becomes everted (ectropion) and the tears run over on to the face (epiphora), the inflammation spreads to the palpebral, and later to the ocular conjunctiva. In bad cases, the inflammation spreads down the outer surface of the lower lid. After a time, the lashes almost completely disappear from the lids, a condition known as lippitudo. Sometimes the cicatricial contraction is more marked on the inner aspect of the lids, causing them to become inverted (entropion). The lashes are then directed towards the eyeball, and consequently rub on the cornea, a condition known as trichiasis. After a time this produces superficial inflammation of the cornea, and subsequently painful superficial corneal ulcers are developed. Chronic ciliary blepharitis is, as a rule, brought about by one or more of the following conditions:—(1) Hypermetropia or hypermetropic astigmatism. (2) Chronic conjunctivitis. (3) Chronic dacryocystitis or chronic inflammation of the lachrymal sac. (4) Local irritation from dust, smoke, and fine particles in the atmosphere. (5) Bad hygienic surroundings. (6) It may follow one of the specific infections, such as measles.

If the condition is due to hypermetropia or hypermetropic astigmatism, and that is properly treated by the use of biconvex or cylindrical lenses, the prognosis is good, and the patient is soon cured. Similarly if the dacryocystitis is relieved, the blepharitis soon disappears. In some cases of long standing,

the condition, however, resists treatment, and the prognosis is anything but good.

In slight cases of *blepharitis squamosa*, the refraction should be carefully tested, and any error of refraction corrected. The fine scales should be removed by a warm alkaline lotion, such as one consisting of sodium bicarbonate, ten grains to the ounce of distilled water. For use, this lotion should be diluted with an equal part of water, which has been previously boiled, and allowed to cool, but when applied to the eyes it must be lukewarm.

After the dried scales and small scabs have been thus removed, a little ointment, as follows, may be applied :—

℞. Unguenti Hydrargyri Oxidi Flavi - pt. j.
Paraffini Mollis - - - pt. ij.
Ft. Ung.

A very small piece of this ointment should be painted on the margins of the lids, with a fine clean camel-hair brush, night and morning, after using the lotion; this prevents the lids striking together during sleep.

In *blepharitis ulcerosa*, as a rule, local treatment must be more energetic. The above treatment must be carried out, but all stunted and badly-formed lashes should be carefully pulled out, scabs must be completely removed, and the following lotion painted along the lid margins :—

℞. Argenti Nitratis - - - gr. iv.
Aquæ Distillatæ - - - ʒj.

This causes the small ulcers to commence to heal; but should there be at the same time any constitutional disease, such as anæmia, tuberculosis, or a tendency to the formation of phlyctenules on the corneo-scleral margin or upon the sclera itself, the child should be given a course of iron such as Syrupus Ferri Phosphatis Co., or the following medicine may also be prescribed :—

℞. Olei Morrhuæ - - - ʒj.
Pulv. Gummi Acaciæ - - - gr. xij.
Spiritus Anisi - - - ʒ v.
Spiritus Chloroformi - - - ʒ iij.
Vini Ferri - - - ʒss.
Aq. - - - ad ʒ ij.

Misce. Ft. Mist. Dose : One to two teaspoonfuls.

NOTES FROM FOREIGN JOURNALS.

BIER'S PASSIVE HYPERÆMIA.

THE first place at this year's Congress of the German Surgical Society was allotted to Professor Bier, of Bonn (Hon. F.R.C.S. Edin., 1905), who described and demonstrated his method of treating acute inflammatory diseases by passive hyperæmia (*Stauungshyperæmie*). This, as regards the limbs and joints, was very fully described in a series of articles appearing in the *Münch. med. Woch.* during the early part of the year by Bier, and later his assistant Klapp described the adaptation of the method to abscesses and inflammations about the trunk, *e.g.*, mammary abscess, boils, carbuncles, and the like. The results obtained were most remarkable. The principle, on which the method is based, is the encouragement of phagocytosis by inducing and increasing, to the utmost extent, the local condition of hyperæmia round about the lesion. Bier is strictly opposed to all forms of anti-phlogistic treatment, as he considers such to be fundamentally in error, and directly opposed to the natural process of healing. His treatment is, in fact, philo-phlogistic to a degree, for the appearance of a limb, after the elastic bandage constricting it has been in place for some time, is said to be quite startling to the uninitiated, as it is swollen, fiery red in colour, and even œdematous. The patient, however, is quite comfortable and free from pain, while the healing process is very greatly accelerated. If pus is present, a small stab-incision is all that is necessary however large the amount. The bandage is kept in place 10 to 24 hours at a stretch, with only short intervals of freedom. For breasts and the surface of the trunk the hyperæmia is induced by the use of large-sized cupping-glasses, the contained air being exhausted to the extent required by means of an aspirating pump. It is claimed that there is far less loss of tissue, especially of tissue weakened and half killed by the inflammatory action. Bier points out that the old-established use of warm applications to inflammatory and purulent affections is, in effect, philo-phlogistic in principle but too mild in degree. He has applied the method to the head itself by applying the constricting bandage round the throat, and reports successful results in cases of middle-ear disease.

Professor Henle cured himself of a severe attack of coryza by adopting this method of treatment, "congesting" himself by a bandage round the neck. Two applications of about one or two hours entirely freed him of his trouble, and he has tried the method in other cases with success.

ALCOHOL DRESSINGS.

This principle of increased hyperæmia as a curative agent is exemplified in the two following methods of treatment, for to that, and to the consequent increase in absorbent powers of the tissues affected, are to be attributed their effect in lessening pain, in decreasing swelling, and in producing a sharp demarcation of any pus present. Löwe (*Allgem. med. zentral. Zeit.*, 1905, No. 9) combines collargol with alcohol. The ointment is soft, smooth,

brown, and smells of alcohol. It contains $\frac{1}{4}$ per cent. of collargol, 70 per cent. of alcohol (96°), hard soap, wax, and a little glycerine. This is applied directly, or spread on lint, to the skin, which must be previously well cleansed. Over it is placed a dressing which hermetically seals up the application. The skin is neither dried nor irritated, but a brisk feeling of warmth is produced almost immediately, and this is accompanied by relief of the subjective troubles. The dressing is applied once or twice a day. It is useful for chilblains, ulcers of leg, frost-bites, contusions, burns, and non-infectious inflammations, such as chronic eczema, and also for a whole series of infectious inflammations, whitlows, abscesses, buboes, infected wounds, &c.

HOT SALT-SOLUTION FOR ULCERS.

Dr. A. Veyrassat, of Geneva, writes in the *Revue Médicale de la Suisse romande*, June 1905, on the use of hot physiological salt solution for the treatment of ulcers of the leg, which he extols over all antiseptics. These, if strong enough to be bactericidal, must necessarily cause death of tissues already lowered in vitality. The salt solution (7 in 1000) used at a temperature of 50° C. has a physiological effect on the tissues promoting phagocytosis, and at the temperature employed is fatal to some bacteria though not to spores. The ulcer is irrigated with the hot solution for a quarter of an hour, and a sterilised dressing (gauze, cotton-wool, and bandage) is then applied. This is done daily until the ulcer cleans, then as often as necessary. Healing proceeds rapidly, and the method is especially suitable for cases which cannot afford the time to lie up in bed.

INDUCTION OF PREMATURE LABOUR.

At the Congress of the German Gynæcological Society, held at Kiel in June, the first discussion was devoted to the methods for inducing dilatation of the cervix in the gravid uterus. Prof. Leopold of Dresden opened with a paper, in which he recommends in the early months of pregnancy the use of plugging, tents (laminaria), and dilators (vulcanite or steel), all of which are sterilisable, effective, and cause little injury. The rubber-bags are unnecessary and dangerous. With the uterus intact, tents are most suitable and are sufficient; in cases of abortion which cannot be checked, plugging the vagina, including the vault of the vagina, renders the best service; in serious hæmorrhage with the os beginning to dilate and when rapidity is necessary, he either uses metal dilators, plugs the cervix to above the internal os, or applies Bossi's instrument. In the later months of pregnancy, when interference is called for by reason of contracted pelvis, eclampsia, or placenta prævia, plugging the cervix still does good service, but is not always effective; rupture of membranes is also good, but labour is prolonged; induction by bougie is also at times a lengthy affair; rubber-bags are quicker, but not applicable in undilated os; they detach the membranes and displace the presentation, and also cause severe lacerations at times. For rapid dilatation the methods for use are:—the fingers, Bossi's instrument (and its fellows), deep incision of the cervix, and vaginal "Cæsarean section" (vaginal hysterotomy). The fingers are dangerous. Bossi's instrument must be used with the very greatest care. It should be introduced during a pause in the pains, and must be dilated only during a pause and very gradually up to nine centimetres. This should take at least

thirty minutes. The instrument is then screwed back and removed, after which labour must be completed without delay. Although this instrument is of the greatest value, it should only be used when the indications are for urgency, as in eclampsia, severe uterine spasms, in very advanced cases of phthisis, imminent danger to child, separation of a normally placed placenta, and for induction of premature labour. It is not suitable in placenta prævia. No modification of the instrument should be used which has no pelvic curve. Unless the greatest care is constantly exercised, severe and extensive lacerations can easily be caused, but with proper care the tearing does not exceed that caused by ordinary instrumental deliveries. Incision of the cervix and vaginal hysterotomy are most suitable for hospital work, only very exceptionally for private practice. Bossi's instrument is recommended for use in general obstetric practice.

Prof. Bumm of Berlin followed with a paper dealing with the surgical methods. He condemned the method of incisions of the fore and after walls of the uterus, suggested by Dührssen, as too complicated and too bloody. Incision of the fore wall is amply sufficient for a child at full term. The procedure is first an incision in the fore wall of the vagina in nearly its whole length up and into the external os and cervix. The bladder is then pushed away from the front of the uterus by means of gauze swabs and dissection with scissors. As soon as the bladder and the fold of peritoneum are separated, the incision is continued up into the fore wall of the uterus as high as necessary; with a full term child 10 to 12 centimetres are quite sufficient. Turning is then performed and a foot brought down. Forceps are difficult to apply and manipulate. A strong dose of ergotin is recommended before beginning the operation. If the uterus does not contract when labour is completed, it should be plugged, and the incisions are then sutured; catgut interrupted sutures being used for the body of the womb, a continuous suture in the vagina. The value of the operation is that the uterus can be opened at any moment in exact surgical fashion, and delivery effected by the natural pains. Half the cases operated on by Bumm were suffering from eclampsia. Although the operation presents no technical difficulties, he urges that it, like the use of Bossi's instrument, should be reserved for the specialist. For the practitioner is best suited turning, and dilatation by the breech after bringing down a foot.

Schäffer of Heidelberg, Hannes of Breslau, and Bürger of Vienna, read short papers commending the use of rubber-bags (*hysterouryse*) whereby the pressure is exerted equally at all points of the circumference, and not as in Bossi's (and other) dilators, by pressure at the points touched by the branches and by tension in the intervening spaces. The dragging force exerted on the dilating bag, either manually or by weights, can be adjusted at will. Von Bardleben recommended the bags in cases where the cervix is relaxed, and incision in undilated conditions.

A very full discussion followed in which the leading obstetricians from all parts of Germany, Austria, and Switzerland took part. Opinions were varied and various. Some adhered to the bags, others preferred Bossi, and others again recommended vaginal hysterotomy as better than any other method, especially in undilated os and placenta prævia. The general consensus of opinion was that both Bossi's procedure and vaginal hysterotomy require special operators, and are not suitable for general practice.

CIRRHOSIS OF LIVER.

Drs. H. Huchard and Ch. Fiessinger discuss the treatment of cirrhosis of the liver in the *Journal des Praticiens*, June and July 1905. For cases having an alcoholic origin, they recommend an absolute milk diet for a period of three weeks to a month. About half a pint is to be taken every two hours. After a month they allow twice a day, in addition to the milk, some soup made by adding one or two tablespoonfuls of farina to vegetable bouillon. A glassful of whey is taken on rising and again at bedtime. Medicinally, calomel and sulphate of soda are employed alternately. Calomel is taken every morning fasting in a dose of $\frac{1}{4}$ to $\frac{1}{2}$ of a grain for one week. The following week, a teaspoonful (75 to 80 grains) of sulphate of soda is taken each morning in a glass of water.

Hot-water affusions are applied to the region of the liver every morning, while at night a cold compress, covered with oiled silk and a layer of cotton wool, is kept in place with a few turns of flannel bandage, and remains on all night. If no albuminuria is present, a flying blister (4 inches by 2) is applied to the hepatic region and kept on for six hours. This is repeated every tenth day.

Daily massage of the abdomen is recommended for 10 minutes, the movements being made circularly. With the massage, this amount of the following ointment may be rubbed in:—

R. "Baume Fioraventi"	-	-	-	-	-	gr. xv.
Tinct. Juniper.	-	-	-	-	-	m xv.
Lanolin.	-	-	-	-	-	} ss 3 i. M.
Vaselin.	-	-	-	-	-	

[Baume Fioraventi contains terebinth, resin, storax, galbanum, myrrh, and other oleo-resins.]

At a later stage the diet is modified, pâtes and vegetables are allowed; potatoes, cooked in their jackets and broken on to the plate with a little fresh butter added; purées of lentils, peas, red beans, &c.

The authors do not find any benefit to accrue from opotherapy, nor do they give, except in syphilitic cases, iodide of potash. Robin recommends benzoate and phosphate of soda as biliary stimulants.

R. Sodii Benz.	-	-	-	-	-	gr. iv.
Sodii Phosph.	-	-	-	-	-	gr. viii.
Pulv. Jaborandi fol.	-	-	-	-	-	gr. iss. M.

To make one powder, to be taken in a cachet three hours after each meal.

For removal of ascites, purgatives are more efficacious and trustworthy than diuretics, but Chauffard recommends:—

R. Oxytel. Scillæ	-	-	-	-	-	3 i.
Potass. Acetat.	-	-	-	-	-	3 ijss.
Potass. Nit.	-	-	-	-	-	3 ss.
Syrup "de cinq racines"	-	-	-	-	-	3 iss.
(Broom, fennel, parsley, asparagus, and smallage.)						
Decoc. Juniper	-	-	-	-	-	3 iv. M.

One tablespoonful to be taken every hour or every two hours.

Robin prefers to use theobromine to induce increased diuresis:—

R. Theobromini	-	-	-	-	-	} ss gr. xx.
Sodii Phosph.	-	-	-	-	-	

To make 3 cachets. One to be taken at 1 p.m. every third day.

For purgative treatment, the alternate weekly dosing of calomel and sulphate of soda is continued. An occasional dose of "Eau de vie Allemande" (a compound tincture of jalap and scammony) is given. After three months the morning doses are replaced by a drastic pill:—

R. Aloe. Barb.	-	-	-	-	-	-	gr. i. $\frac{1}{2}$.
Cambogiæ	-	-	-	-	-	-	gr. $\frac{1}{2}$.
Ext. Belladonn.	-	-	-	-	-	-	gr. $\frac{1}{2}$.
Sapo. Medicat.	-	-	-	-	-	-	q.s. M.

For one pill, to be taken at bedtime.

The patient should be weighed every day, since this affords the most certain information as to the increase, or the reverse, of the ascites. If an increase is found, tapping must be resorted to. The authors are not satisfied as to the value of Talma's operation on the great omentum.

For the distressing hæmorrhages that occur, the following are recommended:—

for *epistaxis* Carnot's gelatine-serum is best:—

R. Sodii Chlorid.	-	-	-	-	-	-	gr. xj.
Aq. Distill.	-	-	-	-	-	-	$\frac{3}{4}$ iiss.
Gelatin.	-	-	-	-	-	-	3 iss-iiss. M.

To be sterilised at 105° C.

Wash out the bleeding nostril, and then mop it out with a pledget of wool soaked in this gelatine solution. Then plug the nostril with a tampon also soaked in the serum;

for *gastric and œsophageal hæmorrhages*, stop all food and drink for twenty-four hours. Apply ice-bags externally and use small "lavements" of sterile salt solution (7 in 1,000) two or three times a day. At the end of the twenty-four hours give the "classic draught":—

R. Calcii Chloridi	-	-	-	-	-	-	3j.
Syrup. Opii	-	-	-	-	-	-	$\frac{3}{4}$ j.
Aq. distill.	-	-	-	-	-	-	$\frac{3}{4}$ iv. M.

One tablespoonful to be taken every hour.

The authors have found hypodermic injections of hydrochlorate of hydrastine once or twice a day act very well;

for *piles* the following are useful:—tampons of absorbent wool moistened with sterile warm water; warm wet compresses (of infusion of marsh-mallow, of lindens, or of Goulard water), covered with oiled silk; Robin praises very highly the ointment of tar introduced into the anus with a finger. For external application a useful ointment is:—

R. Ext. Rhatan.	-	-	-	-	-	-	3ss.
Stovain.	-	-	-	-	-	-	gr. xv.
Ext. Opii	-	-	-	-	-	-	gr. viiss.
Ung. Populi	-	-	-	-	-	-	3j.

(Contains hyoscyamus and belladonna.)

MELTZER'S DIAGNOSTIC EXPEDIENT IN APPENDICITIS.

Palpation of the appendix is greatly facilitated by directing the patient, lying recumbent, to raise the extended right leg somewhat. This puts the psoas into action, and brings the front surface of that muscle nearer the abdominal wall. The appendix can be felt, as a rule, very well against the hard muscular base thus produced.

"CURDS" AS FOOD.

Dr. Monteuiuis, of Dunkirk, calls attention in the *Journal des Praticiens* (July 1, 1905) to the high nutritive value, and other properties of "curds," prepared in the ordinary way or, preferably, by the use of a small quantity of the special ferment of "Yoghourt," the staple food of the peasants in Anatolia, where milk is never drunk *au naturel*. "Curds" are tolerated remarkably well by the stomach and are more easily digested than ordinary milk. They are a phosphatic food, and whey is a diuretic drink of no mean value. Another advantage they possess over milk is the stimulating action they have on the intestines causing easy stools. Metchnikoff has investigated "Yoghourt," and finds the ferment to be a special one, not present in the milk as yielded in France. The curds produced are extremely rich in lactic ferments, which are the most powerful antagonists of the microbes infesting the digestive tract, so that what is practically a regular *bouillabaisse* of microbes is in fact a welcome cleansing agent for the intestine. The micro-organisms are, as it were, microbes "in cudgels." Metchnikoff himself is a firm believer in the virtue of curds, and has taken a bowlful daily for some years. He has several disciples among his colleagues at the Institut Pasteur; Emile Roux being the first to join.

This property, therefore, points out curds for use as a digestive antiseptic in the intoxications arising from septic conditions of the alimentary canal. It is best to begin with a bowlful per diem, but in the case of dyspeptics even half this quantity will suffice. It should be taken on first awaking, and again at breakfast *more gallico*. It is useful also to repeat the dose at bedtime, or at the end of the last meal of the day. The special ferment of "Yoghourt" is obtainable from the Société "Le Ferment," Paris.

AMYL NITRITE IN HÆMOPTYSIS.

M. J. Rouget reports, in *Bulletins et Mémoires de la Soc. Méd.*, good results obtained by adopting Francis Hare's suggestion for the use of amyl nitrite inhalations in hæmoptysis. The first case, in which he tried it, was one of a severe and obstinate character, which had resisted all the usual methods of treatment: rest, cold, morphia, ergotin, dry-cupping, icebag, &c. The first inhalation (10 drops) greatly diminished the bleeding, and a second dose stopped it completely. After this the patient kept the remedy at hand, and was able to avert fresh attacks, which attacks he could always predict from the arrival of a certain taste in the mouth. Nine other cases showed equally good results.

The effect is due to the toxicological properties of the drug, which lowers the blood-pressure and produces vaso-motor dilatation in the peripheral vessels. Filehne has proved that the capillaries in the lung are exempt from the latter effect.

Reviews of Books.

A Text-book of Medical Practice for Practitioners and Students. Edited by
WILLIAM BAIN, M.D. (Durh.), M.R.C.P. (Lond.). With 75 illustrations.
Pp. 993. London: Longmans, Green & Co. Price 25s. net. MACC. 811 D1

ALTHOUGH there are at the present time many excellent works on medicine, we believe that this new text-book of medical practice will find a place amongst the foremost of them. It is written by a number of general physicians and specialists, who have paid considerable attention to various branches of medicine, such as the nervous system, the skin, infective diseases of temperate climes, and tropical diseases. The last chapter is a most instructive one written by Dr. J. Rose Bradford on the Inter-relation of Organs in Disease. The main feature of the book is the inclusion of special chapters on Anatomy by Professor Arthur Robinson, and on Physiology by Professor T. G. Brodie: these are prefatory to the consideration of various groups of diseases. The book is well arranged, and, we believe, will be found exceedingly useful by those practitioners who are reading for higher degrees in medicine. We consider it to be an ideal examination book, but do not think that it will be of any considerable value to those who, busily engaged in practice, require a reference book on medical treatment. At the same time the author is to be congratulated upon having obtained such an excellent list of contributors, and especially for including the Anatomical and Physiological sections, which are usually omitted from works on pure medicine and at the same time are of such importance.

Immune Sera, Hæmolysins, Cytotoxins, and Precipitins. By Professor A. WASSERMANN, M.D., University of Berlin. Authorised Translation by CHARLES BOLDUAN, M.D. New York: John Wiley & Sons. London: Chapman and Hall, Limited. Price 4s. 6d. net.

THIS little book of 77 pages gives a very clear and intelligible account of the discoveries recently made in the field of immunity. The first chapter deals with the phenomena of hæmolysis and agglutination; experiments are quoted proving the existence of two separate bodies, the alexine and the copula, which take part in the processes of bacteriolysis and hæmolysis, while Professor Ehrlich's hypothesis of side-chains or receptors, by which toxins and other substances are attached to the cells of the body, is clearly explained. The second chapter is devoted to an account of the cytotoxines, the bodies which are formed in an animal as the result of injection of cells from another species, and which are capable of destroying these cells, even within the body of the animal from which they are derived. The chief interest of these cytotoxines lies in the prospect of obtaining a serum which will destroy the cells of malignant tumours without injuring the other cells of the patient. Unfortunately, this possibility is at present purely theoretical. The last chapter deals with the precipitins, which are formed in an animal

as the result of injection of blood-serum from another species. This reaction has been made use of, for the purpose of distinguishing between stains produced by the blood of one of the lower animals and those due to human blood, and bids fair to become a valuable means of investigation in forensic medicine. The book before us may be recommended to all who are interested in this fascinating new field of pathology. Its chief demerit is its unduly high price.

Landmarks and Surface Markings of the Human Body. By LOUIS BATHE RAWLING, M.B., B.C. (Cant.), F.R.C.S. (Eng.), Assistant Surgeon, St. Bartholomew's Hospital; Hunterian Professor, Royal College of Surgeons, England. Pp. viii + 76. Demy 8vo. London: H. K. Lewis. Price 5s. net.

THE author, in his preface, states that this book is intended to fill a gap in the series of text-books that are offered to the medical student, and in our opinion it admirably suits the purpose for which it is intended. On reading the work, we cannot but help coming to the conclusion that a vast amount of care and pains have been expended in its preparation. There are twenty-nine illustrations, many of them surface markings on the living subject, all of which are very clear. There are few mistakes, and those will probably be rectified in a new edition, which will doubtless soon be called for. The book will prove invaluable to those working for their final examinations, and it will also be found a very handy reference book for the man in general practice, to whom we can heartily recommend it. Mr. Rawling is to be congratulated on the production of this excellent work.

The Surgical Treatment of Facial Neuralgia. By J. HUTCHINSON, JUN., F.R.C.S., Surgeon to the London Hospital; Examiner in Surgery, R.A.M.C. Pp. 151. 22 illustrations. London: John Bale, Sons and Danielsson. Price 7s. 6d. net.

TRIGEMINAL neuralgia is a disease so appalling in its manifestations, and so hopeless from the therapeutic standpoint, that for many years surgeons have been busily engaged in striving to find some operative procedure by which it could be held in check or cured. Little by little, they have been led from peripheral operations to attack the main trunks, until finally the seclusion of the cranial cavity was invaded, and the Gasserian ganglion itself removed. Mr. Hutchinson lays himself out in this work to maintain the idea that an intracranial operation of this character can alone be expected to give relief. He rightly emphasises the distinction between true trigeminal tic and the limited neuralgia due to local lesions, and strongly supports the view that the former is not even associated, in the majority of cases, with any demonstrable lesion of the ganglion. Occasionally tumours of an endotheliomatous nature are present, but such is the exception, not the rule. This opinion supports the practice which clinical experience has determined, viz., that peripheral operations can give but temporary relief, and that the recurrence is often more severe than the original pain. Mr. Hutchinson, however, admits that if the neuralgia is limited to one division of the nerve, *e.g.*, the second, it is justifiable to deal with that branch by itself as a preliminary

measure. He therefore describes the chief extracranial operations for dealing with the trunks of the 2nd and 3rd divisions.

As to the method of approaching the ganglion, Mr. Hutchinson rightly favours the temporal method. The author does not recommend the osteoplastic method originally advised, but takes away the bone from the temporal fossa down to the infra-temporal crest partly by trephine, partly by cutting forceps or rongeur. A careful and accurate account follows of the exposure and removal of the ganglion, and Mr. Hutchinson is in favour of leaving its upper half with the ophthalmic trunk untouched. The results in his hands have apparently been good, but no statistical statements are made. We are satisfied that this book will be useful in drawing further attention to the success of this operation, and to the best method of undertaking it. It is well written, and maintains its interest throughout. Sufficient illustrations are introduced, and a somewhat incomplete bibliography.

The Surgical Treatment of Bright's Disease. By GEORGE EDEBOHLS, A.M., M.D., LL.D., Professor of the Diseases of Women in the New York Post-Graduate Medical School and Hospital, Consulting Surgeon to St. Francis Hospital, New York, &c., &c. Pp. 327, with two plates. New York: Frank Liesiecki.

WE have read this work with much interest, as the subject is one which is attracting a good deal of attention, and one which, if the author's claims for his operation can be established, is of prime importance.

The author deals with 72 cases, upon which he has operated, up to the end of 1903.

As regards the cases themselves, several points are worthy of notice. Firstly, the number of cases of unilateral nephritis met with, 11 out of the 72 cases, roughly 15 per cent., being on one side only. This is the more remarkable as this condition has been looked upon as a very rare one. In support of the accuracy of his observations, the author maintains that the cases start very frequently as a one-sided lesion, and that the other kidney becomes affected later. He explains the prevailing opinion, on the assumption that the cases previously observed had been examined mainly after death, it being impossible without obtaining a sample of urine from each kidney to determine whether the lesion is unilateral or bilateral.

It must, however, be remembered that the examination of the kidneys is a routine procedure in all post-mortem examinations, and that very many bodies are examined which have not died of the renal affection, so that it is, to say the least, remarkable that the frequency of the unilateral affection has not been noticed before.

There are some points in the published statistics which are far from convincing. Considering the 17 cases reported as "cured." Of these only 4 were free from hyaline casts at the last examination, and of these 3 had casts six months previously. The remaining case was one of nephritis in a child following a burn. The remaining cases, which are described as "ideal cures," had "occasionally a hyaline," "rarely a hyaline," a condition which cannot be described as an ideal cure, especially as one case, which is described in the same terms, is said to have threatening symptoms of uræmia.

It is further remarkable that of these 17 cases all but one are women

under forty. The solitary male case is described in the more extended report as "probably cured."

The cure consists in the removal of the subjective symptoms, in the increase of the urea output, and in the diminution in the number of casts. On examination of the previous symptoms, it is by no means clear they were actually due to the renal condition. Two of the patients, whose symptoms were mainly gastro-intestinal, were also suffering from appendicitis, while many were the subjects of anæmia, which may have had nothing to do with the renal condition, and which might well account for the symptoms. To take an example, Case 6, the first on which the operation was deliberately performed. This patient, a young girl of 20, was admittedly suffering from appendicitis, and her symptoms, which were of six years' duration, were mainly gastro-intestinal. This case is put down as one of interstitial nephritis of six years' standing, although at the time of the operation, six months after albumin was first noticed, she was still passing blood in her urine. It is more probable that the albuminuria was recent, and that her gastro-intestinal symptoms were due to the appendicitis, or some other cause, in which case the diminution in the number of casts in only what one would have expected. She was still passing hyaline casts six years later.

Clinical and Pathological Observations on Acute Abdominal Diseases. By EDRED CORNER, M.A., M.B., B.C. (Cantab.), F.R.C.S. (Eng.); Surgeon to Out-Patients, St. Thomas' Hospital; Surgeon to the Physical Exercise Department, St. Thomas' Hospital; Assistant-Surgeon to the Hospital for Sick Children, Great Ormond Street; Erasmus Wilson Lecturer to the Royal College of Surgeons. Pp. 98. London: Archibald Constable & Co. Price 3s. 6d. net.

THIS work, which is an amplification of the author's "Erasmus Wilson" lectures given before the Royal College of Surgeons, deals with the necrosis of the various portions of the alimentary canal, leading to gangrene and consequent perforation of the gut.

The various conditions are classified into:—

(1) Aseptic cases in which the vascular supply is interfered with; for example, in embolus of the superior mesenteric artery. A valuable collection of these cases is brought together, which demonstrate, that while the collateral circulation in the intestinal area is quite capable of maintaining the circulation of the bowel, if the onset of the obstruction is gradual, yet that, if the obstruction comes on suddenly, extensive gangrene supervenes in spite of the free communication of all the vessels supplying the alimentary tract;

(2) Acute infective necrosis, in which the tissues are killed by the action of micro-organisms, especially staphylococci. The bacillus coli communis, although the most frequent and abundant organism, is probably only a secondary factor in the causation of the necrosis.

Necrosis of the gut is thus brought into line with septic processes elsewhere.

The book is an excellent study of these important cases, and is well worthy of careful attention.

On the Sterilisation of the Hands; a Bacteriological Inquiry. By CHARLES LEEDHAM-GREEN, M.B., F.R.C.S., Surgeon to Out-Patients, Queen's Hospital; Surgeon to the Birmingham and Midland Hospital for Children; Assistant-Lecturer in Bacteriology, University of Birmingham. Pp. 102. London: Simpkin, Marshall, Hamilton, Kent & Co. Price 2s. 6d. net.

THE author deals with the experimental investigation of the relative efficiency of the various methods which have been introduced for the purpose of sterilising the hands. His method of study consists in rubbing the hands with a roughened piece of ivory, which is then dropped into melted agar. The tube is then incubated after the agar has been allowed to set and the colonies examined and counted.

The author is in favour of the following modification of Fürbringer's method:—

(1) The hands are at first scrubbed for five minutes with soap and very hot water (about 50° C.), the water being frequently changed. The use of sterile silver sand as an addition to the nail-brush is an advantage;

(2) The hands are then rubbed with methylated spirit for three minutes;

(3) They are then scrubbed for a minute with 70 per cent. sublimate alcohol (1—1000);

(4) They are then rubbed until dry, and polished on a sterile cloth.

Every surgeon will have his own method upon which he places reliance, and, as the author of this book points out, skins vary in susceptibility, so that a method which is applicable to one surgeon's hands will irritate another's to such an extent as to greatly impair their usefulness.

Great stress is laid on the all-important point of not allowing the hands to become contaminated with pathogenic organisms during the dressing of septic cases, and on the importance of keeping the hands in good cosmetic condition.

Every method of sterilisation has its limitations, and, although primary union may have been obtained, it does not follow that no organisms have been introduced into the wound.

Rubber gloves can be worn for most operations. They are indispensable in septic cases, while their use whenever possible in clean cases, obviating, as it does, the frequent irritation of the surgeon's hands, keeps them in a condition more readily sterilisable for cases in which the use of gloves is a disadvantage.

Functional Diagnosis of Kidney Disease, with Special Reference to Renal Surgery. By CASPER and RICHTER; translated by Bryan and Tanford. London: Rebman, Limited.

WE have already upon several occasions dealt with the advances made in the diagnosis of kidney diseases by modern methods. The book before us forms an excellent *résumé* of such methods. A careful study is made of the comparative values of the various modes of stimulating renal permeability.

Cryoscopy and the methylene blue test are accorded lengthy and skilled consideration, and less useful methods of examination are also dealt with. The authors conclude with an account of their own experimental results. For surgical purposes, they consider that the determination of the molecular concentration of the urine and the phloridzin test form together the most useful indications of renal adequacy. Detailed directions are given for carrying out the various tests. The book, on that account alone, should prove of great value to the diagnostician.

Novelties and Notices.

DR. THEINHARDT'S FOODS.

(Messrs. Hartmann, Hohman & Co., London and Manchester.)

WE have received two samples of Dr. Theinhardt's Foods. One preparation is a food for infants which contains about 50 per cent. of soluble carbohydrate, 6 per cent. of fatty matter, and 3 per cent. of mineral salts rich in phosphorus. The food is to be prepared with hot water and milk. It is highly nutritious, easily prepared, and is pleasant to the palate. The other preparation is Hygiama, which contains about 65 per cent. of carbohydrate, the greater proportion of which is soluble, 11 per cent. of fatty matter, 22 per cent. of nitrogenous matter. We recommend the food as a nutritious beverage for delicate and growing children and invalids. It has a pleasant flavour, and is easily digested.

ROBORAT.

(Roborat Company, Manchester.)

THIS preparation contains unaltered vegetable albumen, and a proportion of fatty matter, which is present in a form which is easily digested, absorbed, and assimilated. There are present also mineral salts, which were originally present in the grain from which the food is made. These are chiefly phosphates and chlorides, the physiological value of which is well known. We find that Roborat is easily digested, and that it has a high nutritive value. It may therefore be given with advantage to those whose digestive energy is weakened.

STANDARD CHEMICAL DISINFECTANTS.

(Jeyes' Sanitary Compounds Co., Ltd., 64, Cannon St., E.C.)

WE have received from Messrs. Jeyes this small pamphlet on Standard Chemical Disinfectants, which has been written by Mr. Wolf Defries, B.A., the main purpose of which is to describe a method of supplying disinfectants under which their specific disinfectant values may be defined and compared in relation to their price. Particulars are given of *Cyllin*, a disinfectant which is supplied under the express guarantee that every delivery is permanently homogeneous, and has a disinfectant efficiency eleven times as great as that of pure carbolic acid when tested against a vigorous culture of the *Bacillus typhosus*. Messrs. Jeyes will be pleased to forward a copy of the pamphlet to any reader mentioning this Journal.

COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the August Competitions will be announced in the October number.

a.—The Subject of the Essay for September will be

The Nature and Treatment of Hæmophilia.

b.—Answers to the following questions are invited :—

1. What are the causes of paraplegia ?
2. What are the conditions which lead to necrosis of the lower jaw ?
3. A child aged three years was admitted to hospital with the following history :—She had been well until eight months old, when she had abdominal pain with vomiting, and she passed bright red blood per anum. The symptoms persisted for four days and then ceased ; when eighteen months old the pains returned, and much more blood was passed per anum, when the pain was relieved. There were two more attacks of this kind. A month before admission the abdominal pains, vomiting, and bleeding returned and persisted ; the bowels were free, but the motions offensive. A week before admission she passed blood with the motions, the pain was then great, sickness frequent, and the child would not take food. On admission a large mass could be felt in the right hypochondrium, the tumour was irregular, hard, and movable. Under an anæsthetic the tumour was found to be irregularly oblong, about 3 inches in length and 1½ inch in breadth. Both kidneys could be felt, the left loin seemed fuller than the right. There were no signs of congenital syphilis. The urine was normal. What is the diagnosis of the case, and what treatment should be adopted ?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of October, 1905. No Essay must contain more than three thousand words, and the Editor reserves the right to publish any Essay which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of October, 1905.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.

(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

THE PRACTITIONER.

OCTOBER, 1905.

HYGIENE OF THE MOTHER BEFORE THE BIRTH OF HER CHILD.

By J. W. BALLANTYNE, M.D., F.R.C.P.E., F.R.S. (EDIN.).

Physician to the Royal Maternity and Simpson Memorial Hospital, Edinburgh; Lecturer on Midwifery and Diseases of Women, Medical College for Women and Surgeons' Hall, Edinburgh.

IT is an ancient belief that the health of the unborn infant is directly influenced by that of his mother. Plutarch, that prince of biographers, in his account of the Spartan Lycurgus, states that "he" (Lycurgus) "willed that the maidens should harden their bodies with exercise of running, wrestling, throwing the bar, and casting the dart, to the end that the fruit wherewith they might be afterwards conceived, taking nourishment of a strong and lusty body, should shoot out and spread the better; and that they, by gathering strength thus by exercises, should more easily away with the pains of child-bearing." This law, paraphrased and adapted to modern times, might read that unmarried women should play golf, tennis, cricket, and croquet, so that when married, they may bring forth out of their own healthy bodies healthy children, and that the process of labour itself may be facilitated. It seems indeed, most reasonable, that such good results should follow such laudable hygienic endeavours; but do they? In order to understand why healthy mothers do not always produce healthy infants, and why unhealthy mothers sometimes give birth to well-nourished children, it is necessary that the complex conditions of antenatal life be very briefly stated. So long as the medical profession believes that it is a simple matter to influence the unborn infant by influencing the mother, so long will the individual practitioner be disconcerted by constantly recurring cases in which influences, both good and bad, seem to have miscarried. The problem is not simple but complicated, and from this complexity, discouragement necessarily emerges,

and by it therapeutic enthusiasm is chilled. To make any progress, we must frankly accept the situation, we must recognise that the task of influencing the infant before birth is arduous, because the mechanism, by which antenatal growth and development are regulated, is complex, and we must at least make the attempt to understand the latter in order to overtake the former. But is it worth while? Most certainly it is, and for this reason. If it can ever be discovered how the health of the unborn may be influenced for good, by any treatment which we can apply to the mother, the first step in the effective prevention of disease and deformity will have been taken, and no medical man with imagination can fail to be impressed by the possibilities of beneficent therapeutics, which must follow such a discovery. The prize is high, therefore the difficulties are great.

MOTHER AND FŒTUS.

By the act of birth, the close antenatal relations between the pregnant woman and her foetus are replaced by the less intimate postnatal ones, which exist between the nursing mother and her suckling. Even after birth, we all recognise that the health of the child is influenced in no small degree by the quality of the mother's milk ; but the foetus in the uterus is almost absolutely dependent upon the maternal organism. The foodstuffs, which he receives, come to him from his mother ; the oxygen, which his tissues breathe, comes from her blood into his ; the results of his metabolism are carried away in her excretions. Between the two organisms, however, is placed the placenta. It is possible that there may be a more circuitous path, by which, in exceptional circumstances, materials may pass to and from the foetus, but, in the great majority of cases, the placenta is the avenue by which food and air reach the unborn infant, and the outlet by which excretions leave his body. The placenta, therefore, is the open communication between mother and foetus? Nay, every student of Obstetrics knows that it is rather to be regarded as a filter or sieve, permitting some things to pass and keeping back others ; the fluids and gases of the blood pass, but not, so far as is known, the red corpuscles ; some nutritive materials make their way through, but not others ; some medicinal substances are transmitted, while others are not, and yet others are apparently

stored up in the filter which thus becomes for them a gland. Further, pathology tells us that the germs of disease may be sent through the placenta from mother to child (perhaps also from child to mother), and that some, such as the bacilli of tubercle, pass with great difficulty, while others easily traverse the barrier. Yet again, there is some reason to believe that the placenta is at one time more permeable than at others, so that what may pass to-day may not do so to-morrow. In many other ways, the placenta shows the complexity of its physiology, but enough has been stated to prove that the relationship between mother and foetus is not only intimate but complex, and that the placenta is the organ, which more than any other, dominates the foeto-maternal interchanges.

MOTHER AND EMBRYO.

It is towards the close of embryonic life that the placenta is built up. Previous to the establishment of the placental economy, the new organism is brought into relation with the mother by means of the decidual membranes. Of the laws that govern the transmission of materials from the maternal to the embryonic organism, we know much less than we do of those, that regulate the placental interchanges; but there is reason to believe that the relations between mother and embryo are not less but more intimate than those between mother and foetus. Further, the new organism, in the embryonic period of its development, is capable of being more profoundly influenced by surrounding circumstances, favourable or unfavourable, than is the foetus; the embryo, when attacked by morbid causes, may become deformed or monstrous, while the foetus, when similarly attacked, becomes diseased. The complexity of both the physiology and the pathology of embryonic life is doubted by no one, and the difficulties, which must of necessity be overcome before we can systematically and definitively influence the embryo through the mother, are very great.

MOTHER AND GERM.

The ovum is simply a cell in an organ (the ovary) of the mother's body. In the germinal period of antenatal life, therefore, the relations between the mother and the future child are those which exist between the whole organism and one

of its parts. In a sense, the ovum stands to the mother as one of the hepatic cells does to the whole body. Implanted in the maternal tissues, and surrounded by the maternal secretions, it cannot be but that the new organism shall be influenced by the state of health of the mother. How the influence is exerted, and by what laws it is regulated, we know little, but we do not doubt its reality. When, further, the ovum is impregnated by the spermatozoon, a new influence is introduced, and a paternal factor comes into play. The germ is now the meeting place of two streams of ancestral tendencies. In some way or other, it is decided which of these two influences shall be the more potent, and in what degree they shall be combined, and with what results; but the whole subject is one of profound complexity, as every biologist, who has given any attention to the study of heredity, well knows.

ANTENATAL INFLUENCES.

In each of the three periods, therefore, into which antenatal life has been divided (the foetal, the embryonic, and the germinal), the parent influences the offspring; but in none of these three periods can the influence be with certainty regulated, for in none of them do we yet possess full knowledge of the mechanism, by means of which it comes into action, or of the laws which govern it. The treatment, therefore, of the unborn infant must be empiric, until such time as the mode of action of antenatal influences shall have been determined. It may hasten the accomplishment of such an advance in our knowledge, if I indicate some of the inquiries which may, with profit, be carried out. In the first place the whole problem of the placental interchanges calls for investigation. There is no reason why the placenta should not be examined chemically and histologically in all cases of labour in maternity hospitals, and in many instances in private practice. If this were done, and the results compared with the clinical data, such as the weight of the infant and its development, it might be possible to determine the microscopical appearances characteristic of a placenta, with transmitting power, and those of one in which the transference of materials, nutritive, medicinal, or poisonous was difficult or impossible. At present little is known of the meaning of the various microscopical appearances of the placenta in health and disease, and still less of its chemistry.

In the second place, the examination of the liquor amnii might yield some interesting results ; the analysis of the urine has told us much about the state of the adult body, and that of the liquor amnii may reveal something, at present unknown, regarding the physiology of the foetal organism. In the third place, the investigation of all miscarriages, and of early abortions, must be carried out with great care, not so much for the purpose of learning the development of the various embryonic organs, as for that of determining, how pathological changes in the deciduæ, amnion, and chorion are related to the previous health of the mother, and the present condition of the embryo. Again, a strict comparison ought to be instituted between the health of the mother and the state of her offspring in succeeding pregnancies ; not startling differences alone should be noted, but the apparently unimportant resemblances. Many other ways might be named, by which the mode of action of antenatal influences might be determined ; but enough has been said on this subject to demonstrate the pressing need that exists for such researches, and to indicate the possible discoveries that might flow from them.

CLINICAL OBSERVATIONS.

Some years ago I had an opportunity of watching a young primipara during her pregnancy. She had been delicate as an unmarried girl, and had at one time spent several months on her back on account of "weak spine." For the first four or five months of pregnancy she was in a poor state of health ; then she began suddenly to gain in weight, to put on flesh, and to enjoy very good health. The infant, a boy, was poorly nourished, and the placenta was of the marginate or circumvallate variety. It seemed to me that in this case the mother benefited from the increased metabolism of later pregnancy to such an extent, that the growth of the foetus suffered, and that the malformation of the placenta was a possible factor in the unequal distribution of the nutrition.

In another case, a mother, far advanced in phthisis, gave birth to a plump, well-nourished child. In this instance the foetus seems to have been the preferred part, so far as nourishment was concerned. The physiological processes of the mother resulted in the complete nutrition of the foetus, but

failed to help the maternal organism itself. It is possible that the mother's tissues, invaded by tubercle bacilli and their toxines, were incapable of utilising nutriment, while the foetal structures, protected by the placenta from the microbic invasion, could continue to do so.

In another case, a woman, with a hereditary history of hæmophilia, gave birth to two hæmophilic male infants in successive pregnancies. In her third pregnancy, she was given chloride of calcium during the last five months, and was delivered at full term of a healthy male infant, showing no traces of hæmophilia at all. It is reasonable to suppose that, in this case, the medicine may have passed through the placenta from mother to foetus, and have counteracted the bleeding tendency.

In yet another case, a woman gives birth, in succeeding labours, to infants some of whom are deformed, others diseased, dead-born, or premature, and others quite healthy. Her husband and herself are healthy, although there is a suspicion of alcoholism in the former. She herself has a malformation of the thumb, which her mother and a sister also have, and three of her infants show malformations of the thumbs along with their other deformities (anencephalus in one, hydrocephalus in the other two). In this case, adhesions of the amnion were noted, and the question arises whether any morbid influence in the mother's system acted upon the development of the embryonic membranes, and led to the disturbed organogenesis. If this explanation be accepted, it is necessary to suppose that, in some of the pregnancies (those ending in the birth of normal infants), the disturbing influence was either absent or was counteracted.

A very nervous patient, about the third or fourth month of pregnancy, is in her carriage when it runs over a little boy. She is much distressed at the time, and is apprehensive of the future; but her child is born healthy and with no deformities. This is an instance of no ill result following a maternal impression. I need not cite cases in which all sorts of malformations in children are supposed to have resulted from frights received by the mothers, for they are commonly reported in medical journals all over the world. While I do not believe in the power of an impression to reproduce,

photographically as it were, its likeness upon the foetus in utero, I regard it, as quite possible, that mental states may have evil or good influences upon the unborn infant ; but this does not alter the fact that, in some cases, the influence is apparently transmitted to the child, while, in others, it is not.

These cited cases are, I think, more than sufficient to prove that the maternal influence upon the foetus in utero is not a simple but a very complex matter, and that in the absence of knowledge of the factors at work, and of the laws that govern them, we can hope for no exact therapeutics of antenatal life. In this uncertainty, we are compelled, therefore, to deal empirically, until such time as definite information about the foeto-maternal interchanges (normal and pathological) is forthcoming, and until the laws of hereditary transmission shall have been elucidated.

HYGIENE OF THE PREGNANT WOMAN.

Theoretically it is to be expected that the better the general health of the pregnant woman is, the greater will be her chances of giving birth to a healthy well-formed child, and although experience has shown that, in this matter, theory does not always agree with facts, it is obvious that the health of the mother is what the physician is mainly concerned with, when he attempts to influence for good the unborn child. At the same time, it is well to keep in mind that a healthy woman may give birth to an unhealthy or deformed child. All the organs of the body of a man may be healthy save one (*e.g.*, the lungs), and all the functions of the body may be perfectly performed save one (*e.g.*, procreating) ; so in the process of child-bearing a woman may fail only in one part, and that part may be the bearing of healthy children. Reproduction is a function, which is active only during a part of life, and stands to some extent apart from the other bodily activities, so its pathological deviations may likewise possess a certain degree of independence.


It is common for medical men to advise pregnant women that they need only obey the ordinary laws of healthy living, that they require no special food, and that their exercise, rest, habits, and customs may be continued during gestation as they were in the non-pregnant state. This is safe advice, if the food,

habits, and customs of the woman were governed by the laws of hygiene during her non-pregnant state ; but if they were not, then it becomes a danger, and sometimes the result is, that a woman, who has habitually broken all the laws of health, when not pregnant, continues to do so when she is carrying her child. The first matter, therefore, to which a physician should attend, when called to the care of the pregnant woman, is to ascertain that her diet, dress, exercise, habits, and the like, were healthy during her unmarried life ; having determined this, he may, with some safety, recommend the continuance of them. There is no reason to recommend her greatly to increase the amount of food taken, for most women (like almost all men) take enough to leave a sufficient margin for the nourishment of the embryo and foetus (which weighs not more than a fourteenth or sixteenth of the mother's weight). Certain articles of food may be specially favoured by the pregnant woman, and, so long as they are neither injurious nor disgusting, they may be allowed, for there is some reason to believe that certain physiological needs of the tissues (of mother or foetus) are thus satisfied. Exercise should continue to be taken during pregnancy, but not in excess nor in dangerous forms. Bathing is, of course, to be continued, but there is no need to commence new kinds of it, such as sea-bathing, during gestation. Well-ventilated rooms ought to be occupied both by day and night, and crowded gatherings ought to be avoided whatever may be their nature. Unpleasant sights should be avoided, for, whatever be our belief regarding the potency of maternal impressions, there is every need to shield the patient from the dread of evil influences, and from depressing forebodings as to the state of the unborn infant. The dress worn ought to bring no pressure to bear upon the upper part of the growing uterus ; therefore the corset must, sooner or later, either be given up or used in association with an abdominal belt which gives support from below upwards. The modern type of corset is specially to be guarded against.

Oxytotic drugs must be avoided, but it is noteworthy that large doses of quinine or of salicine may be given during a pregnancy, associated with malaria, or rheumatism, or Malta fever, without causing premature emptying of the uterus,

possibly because the pharmacological effect of the drug is exerted upon the morbid process, and so the uterus escapes. The pregnant woman should shield herself from infectious fevers such as scarlet, measles, typhoid, and diphtheria; and, in the presence of an epidemic of small-pox, she ought to be revaccinated for the sake of her unborn child as well as for her own. She ought also to be protected by law from following trades, such as type founding, which, from the risk of lead poisoning associated with them, bring the dangers of abortion and all its sequelæ.

So far I have spoken only of prevention, for that is the matter with which I am dealing; but it is obvious that all diseases of the pregnant woman should be treated promptly, and along the recognised lines for the sake of her unborn infant. The treatment of syphilis is a case in point, and there is reason to believe that mercury, applied topically through the vagina, has a more immediate and beneficial effect upon the foetus than when given by the mouth. Anæmia likewise should be corrected, constipation overcome, and hepatic and gastric disorders remedied. Finally, and I have left it to the last on account of its great importance, the urine should be regularly tested during the whole of pregnancy for albumen, so that we may be able to detect the earliest sign of renal inadequacy, and prevent (by diet, &c.) the occurrence of eclampsia gravidarum, that dire disease which is so fatal both to mother and foetus.



SOME POINTS REGARDING THE MOTHER'S MILK IN THE EARLY WEEKS OF INFANT LIFE.

By M. HANDFIELD-JONES, M.D. (LOND.), F.R.C.P.,

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FEW questions are more frequently under the notice of the general practitioner, and require more careful consideration, than those which concern the feeding of an infant in the first few weeks of its life. All medical men are agreed that the best results are obtained for both mother and child, when the infant is fed from the breast, and that no other method of feeding is so likely to be free from difficulties. The advantage to the mother is shown by the greater rapidity with which the uterus returns to its normal size under the stimulus of lactation, while, as regards the child, freedom from intestinal derangements and evidence of good nutrition prove how great the advantage is for the infant. These facts being proved, the question naturally arises, why is it that such a large number of children are brought up in the present day as "bottle-fed" infants? Here we must allow that a great difference exists between children of the upper and lower classes. Among the latter, the vast majority of women successfully nurse their infants, and prove themselves excellent mothers.

Enquiry at the various lying-in hospitals reveals the fact that the percentage of women in these institutions, who do not suckle their children, is very small; probably, not more than about 10 per cent. Among the upper classes, however, the case is very different, and it would seem that breast feeding is becoming more and more rare. It will be interesting to consider in the first place the reasons, or objections, which are supposed to exist against the practice of breast feeding.

In studying the causes of non-lactation, we may divide the mothers into various groups. Thus there are women, in whom the breasts are perfectly formed, and in whom the secretion of milk is abundant and normal in every respect, and yet who refuse to suckle their infants. In some of these

instances good reasons may exist. For instance, in the lying-in hospitals and maternity charities, one comes across poor women, who have to earn their living at factories and houses of business, and who return to work within a fortnight after delivery, and in whom nursing is of necessity an impossibility. Again, among the leisured classes there are women who suffer from tubercular disease, or neurasthenia, or, it may be, heart disease, and who, though willing and able to suckle their children, yet, owing to physical infirmities, are unequal to the strain.

These cases, however, form only a small fraction of this group, and, in the majority of instances, these mothers refuse to nurse, solely because the function would seriously interfere with their social engagements or pleasures. Without doubt, the weakness of these patients is fostered considerably by the action of many monthly nurses. It is a temptation to stand well with the mother by pandering to her selfish wishes, and again there is a point of personal comfort to be gained. As long as the woman suckles her infant, the monthly nurse must rise two or three times in the night to bring the child to the mother, and must remain awake till the feeding is accomplished, but wean the baby, and things are altered for the better as regards the nurse. Now she can have the child near her in bed, and can have the bottle of food kept warm close at hand. There is no need to leave her bed, no need to stay up till feeding is over, no trouble in persuading the refractory infant to take hold of a rather flat nipple. Can one wonder at the appeal to unregenerate human nature? Personal experience has taught me that, if nurse is against breast feeding, it is hopeless to persevere in the unequal contest.

There is a second group of women, who have serious difficulty in ministering to the wants of the child, owing to some anatomical defect. Thus, the breast may contain an insufficient amount of secreting tissue, or the nipple may be flat or depressed. In many of these cases, the difficulty can be overcome by a little patience and self-denial, especially if both mother and nurse are determined to succeed. The deficient amount of mother's milk may be supplemented by one or two bottles daily of humanised milk, and the trouble with the nipple may be overcome by the use of the india-

rubber shield. In a large number of instances, however, after two or three days of struggle, all further attempts are abandoned in favour of the bottle with its comfortable india-rubber nozzle. It is certainly a matter for study by the evolutionists why so many young women of the present generation, who are tall, athletic, and of marked muscular build, have such a poor development of their mammary glands. Does it represent nature's protest against the aping of the male organism by the young women of to-day?

A third group is formed by those women, who have well-formed breasts, and who often at first produce an excess of healthy milk. During the three or four weeks after delivery all goes well, and they have abundant supplies for their infant; but as soon as they leave their beds, and begin to resume the ordinary duties of life, the supply of milk rapidly fails, and soon disappears altogether. From time to time, one meets with young women, who are able to attend to the wants of their offspring, while they are living quiet lives in the country, but who promptly lose the power of secreting milk as soon as they come into big towns, and begin to lead a life of stress and bustle. Some of these patients can go on suckling for several months, if they nurse the infant during the day time only, and have their night's rest undisturbed. At night the child is fed by the bottle. In the minds of the older nurses an idea existed that mother's milk and modified cow's milk could never be tolerated by the same infant; but all experience goes to prove that an infant will thrive perfectly, while being suckled by its mother during the day, and fed by some artificial food during the night. The women, who form this group, are generally mothers who are handicapped by an unstable nervous system, their energies are rapidly dissipated, they are easily choked by the cares and anxieties of this life, and so, being easily exhausted, bring no milk to perfection.

The fourth group will include those patients in whom, for some reason, the chemical composition of the mother's milk does not agree with the digestive organs of the child. Here various conditions may be present. In some instances the milk of the mother is of low nutritive quality and deficient in fats. The child does not seem ill, but is constantly crying and seems unsatisfied, there is little, if any, gain in body

weight, constipation is often present, and the stools are unduly hard and firm. Relief is soon obtained if some additional fat is added to the dietary; 20 or 30 drops of cream may be diluted with some of the mother's milk, drawn off by the breast pump, and administered at the end of each meal. Occasionally a bottle of cow's milk, diluted with barley water (1 in 3), and given night and morning instead of the breast, serves the same purpose. In a few cases, the want of a sufficient supply of milk sugar is a cause of the malnutrition, and a dose of lactose (20 to 30 grains), administered three or four times in the 24 hours, has had a most beneficial result. Quite recently, a case came under observation in which it seemed absolutely essential that the child should be weaned, owing to the griping and purging which attended the breast feeding, and yet, in this case, the mother's milk agreed perfectly, when a bottle of one of the chemical foods was administered morning and evening. On several occasions an attempt was made during the first three months to dispense with this addition, but on each occasion the evidence of imperfect digestion rapidly returned.

The use of alkalis in assisting the digestion of the mother's milk is well known to practitioners. Children will be griped, and pass undigested curd, when fed by the mother, and yet such a simple prescription as the following given to the child shortly after it has taken the breast will relieve all the distressing symptoms:—

℞ Sodii Carb.	-	-	-	gr. i.
Sodii Citrat.	-	-	-	gr. iij.
Sp. Amm. Aromat.	-	-	-	℥ ij.
Syrup. Simpl.	-	-	-	℥ xx.
Aquæ Anethi.	-	-	-	ad 3 i.

It is important, before insisting on the cessation of breast feeding, that we should assure ourselves that there is no secondary cause which is disturbing the chemical composition of the mother's milk. Sometimes the mother is in the habit of taking Hunyadi-Janos, Apenta, or some saline purge every morning, and the medical attendant is not told of this custom, and so the digestive disorders of the infant are perpetuated, until the morning dose is noted and discontinued.

In one instance, the mother was taking tabloids of Easton's syrup unknown to her doctor, and the strychnia in the syrup was the cause of the child's intestinal disorder.

Emotional causes may play a part, and are sometimes very noticeable. Thus, Mrs. S. was a primipara of an excitable and irritable temperament; her monthly nurse was an excellent woman, but obstinate and tactless, and, as a result, endless rows arose in consequence of lactation being difficult, owing to rather small and depressed nipples. During these times, the child was constantly griped and lost weight. When this nurse left, and a more placid and tactful woman took her place, the mental irritation soon subsided, and the mother's milk ceased to cause trouble to the child.

These examples might be multiplied to any degree, but enough has been said to show that much may be done to make breast feeding possible and profitable, and to avoid too early resource to weaning of the infant.

There are a few additional points, which are worthy of consideration in relation to the secretion of milk by the mother. Thus, when the breast is taken by the child at periods of less than two hours, the milk is said to become more concentrated, and is, therefore, digested with greater difficulty. On the other hand, when an unduly long interval between the meals is permitted, the solid constituents of the milk are so reduced as to seriously diminish the nutritive value of the secretion. Again, the question may be raised, as to how far alterations in the dietary of the nursing mother has any influence upon the quality or amount of the secretion. With regard to this point, it is asserted by Norris that a diet, which is largely vegetable, will increase the proportion of sugar, and diminish that of fat and caseinogen, while an excess of albuminous food will increase the fat and caseinogen, while diminishing the proportion of sugar. Again, the employment of alcoholic and malt liquors will also lead to an excess of fat and caseinogen.

We are all aware how nurses and even doctors are strongly of the opinion that a certain amount of bottled stout is of immense value to the mother, as it improves both the amount and quality of her milk. While this may be true in the case

of some feeble and anæmic women, it is none the less certain that, in many cases, it acts harmfully by disturbing the chemical composition of the mother's milk, and by thus bringing about digestive disturbances in the infant.

Zaleski found that not only were fat and albumen increased in the milk of mothers taking malt liquors, but that the milk sometimes actually contained alcohol and the micro-organisms peculiar to malt liquors. Klingeman learnt from his investigations that, when the nursing mother took alcohol in moderate quantity, there was no evidence of its presence in the milk, but when the quantity was increased, a small amount passed into the milk. This amount, he thought, was usually insufficient to have an ill-effect upon the suckling, but the changes produced in the constituents of the milk were quite noticeable.

According to Strumpf, alcohol taken by the mother so changes the fatty and albuminoid contents as to diminish the nutritive value of the milk.

Unless it is certain that the mother's milk contains too little fat and caseinogen, malt liquors should not be recommended, and when they are taken, the first appearance of digestive disturbances in the infant is a signal, that the malt should be discontinued, or greatly diminished. It is quite true, as Norris suggests, that stout is rarely advisable in the early weeks of lactation ; it is rather in the latter half of the suckling period that the mother's milk is likely to be deficient in those substances, for whose increase a malt preparation is indicated.

If, for any of the above reasons, an infant cannot be nursed by its own mother, there can be no doubt that the best course is to obtain the services of a wet-nurse. Of necessity, there are various drawbacks and objections to this course. The mother from sentimental motives may dislike the thought that her child is obtaining its nourishment from the breast of another woman ; it is again often difficult to secure a suitable woman at a short notice ; the wet-nurse, when obtained, may in a few instances prove to be unsuitable, her milk not agreeing well with the baby. The presence of these women, sometimes drawn from the lower orders of the population, is at times unpleasant in the house ; and, lastly, there is always the fear that some disease, such as syphilis, may be imparted by the

wet-nurse to the child. As regards the third point, it is true that, occasionally, one or two wet-nurses have to be tried before one is found, whose milk agrees well with the small patient, but in my own experience, it is very seldom that this difficulty arises. Indeed I have been surprised to find in how few cases the milk of the foster-mother fails to agree, if reasonable care has been taken in the choice. Thus, it is important that the infant of the wet-nurse should be about the same age as the foster-child, also that her child should present all the appearances of a healthy, contented, and well-nourished infant. It is important that the wet-nurse should be between the ages of 20 and 30. The milk of a very young woman and that of an advanced multipara are much less likely to agree. Care should be taken in assuring oneself that the breast of the wet-nurse is well formed, and that the nipple is normal in size and position. Granted that these conditions are satisfactory, it must be very seldom that the wet-nurse proves a failure.

The difficulty, which is more likely to arise, is change in the composition of the nurse's milk, owing to the change of her surroundings. In most cases, a woman who works hard, and feeds sparingly, or, at all events, on simple food, is taken into a house where she leads a lazy life, and is probably over-fed. It is for these reasons that the milk of the wet-nurse, after the first few weeks, begins to disagree with the child, and causes intestinal disorders.

Regarding the transmission of syphilis or tubercle, too great care cannot be taken; in every case, the medical attendant must of necessity ask questions regarding any possible symptoms of specific infection. The history of the woman as regards miscarriages should be carefully gone into, but perhaps the best test is the condition of the wet-nurse's child, and this is specially important when the child has reached the sixth or eighth week of its life, as, by that time, manifestations of inherited syphilis would almost certainly be present. In cases in which the wet-nurse has been obtained from an infirmary, or from the lower population of the large towns, the possibility of syphilitic transmission is most likely to arise, as, in many of these cases, the nursing mother is an unmarried primipara, who has been exposed to infection.

Where, however, the wet-nurse is obtained from a lying-

in hospital, or through a medical friend, who knows the history of the family, there is comparatively little risk.

There is certainly one point to be considered on the opposite side, namely, the risk of bringing a healthy young mother to nurse a syphilitic infant. Here the risk of infection is so great from child to mother, that it would be almost criminal to expose the wet-nurse to this possible contagion. Medical men, as has been already said, find it often very difficult to obtain a wet-nurse at the time when they most need one, so that it is well to know that excellent nurses can often be obtained from among the peasant classes of the north of France, and that an agency exists in Paris through whom they can be secured.

Failing human milk, whether supplied by the child's own mother, or by a wet-nurse, we are left to choose between two courses. Shall we modify the milk of the cow, or some other animal, in such a way as to approximate its composition to that of human milk, or shall we resort to the various artificial foods, which are provided by well-known firms of chemists? In the vast majority of cases, the baby will thrive well on ordinary cow's milk and thin barley water, provided that the child has an ordinary amount of vitality, and that the milk is fresh and the bottle clean, also that the mixture is administered in a reasonably diluted strength. There is, however, a small percentage of infants, who will not thrive on this régime, and, in their case, I am bound to confess that no accurately scientific diet, no teaching of bacteriology, and no physiological laws of digestion avail us one iota. Each infant is a scientific experiment in the merits and demerits of curds and whey.

Far be it from me to minimise the value of such excellent preparations as the "humanised milk" of some of the large dairies, as the Walker-Gordon milk, or Paget's, or many others. They all are scientifically correct, their chemical composition is excellent, and in them the curd is approximated to the small, soft, flocculent curd of the mother's milk; but they all prove failures at times, and the infant stomach rises superior to chemical formulæ. It is in these cases that some one of the artificially prepared foods comes out triumphant.



THE ARTIFICIAL FEEDING OF INFANTS.

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IN the unfortunate circumstances which debar an infant from obtaining human milk, a suitable substitute must be provided. It is generally accepted by the profession that the best substitute is the milk of some other animal, and that the cow is the animal on which we must rely. Cows' milk can be got with ease, for it is cheap and widely distributed. Unfortunately it possesses many disadvantages, and often leads to ill-effects. Some of these are due to its biological and chemical imperfections as a food for infants, while others result from ignorance of the proper methods of dealing with the milk and the minutiae of infant feeding.

No one can prove a trustworthy adviser on the diet of an infant, unless he is profoundly impressed with the importance of accuracy and attention to details, the necessity of giving clear directions in writing, and the value of careful observation and of the evidence indicating the necessity for alteration in the diet.

The doctor must know, and be able to apply, the metric system of weights and measures, and must think in percentages. He must know the average percentage composition of human and cows' milk. He must be able to appreciate, at their proper value, the indications derived from the general condition of the child, its restlessness, hunger, pain, or contentment, and from the character of the stools.

Weighing.—The child should be weighed regularly once or twice a week, even daily in certain cases. If it is gaining weight steadily, is passing normal stools, is contented, and sleeps well, the diet is satisfactory in quantity and quality. The rate of gain is variable. It should average from 5-7 oz. per week during the first three months, 4-6 oz. per week during the second three months, and 3-5 oz. per week during the third three months of life. When there is a loss in

weight, or an absence of gain, careful investigation must be made in search of the cause. Thus it may be due to insufficient quantity of food, a defect in quality either of excess or deficiency of one or more constituents, gastro-enteric troubles cold weather, insufficient clothing, teething, onset of illness, &c.

The Milk.—Good results must not be expected from bad milk. Unfortunately much unsatisfactory milk is delivered to the public, with a resulting excessive infantile mortality. The attention of the profession and of public authorities should be concentrated on obtaining a supply of clean, fresh, pure milk, and not diverted to the manipulation of a stale and filthy fluid. Milk should be as fresh as possible, for the older it is the further is it removed in character from a living fluid, the greater is its acidity, and the more numerous are the shoals of micro-organisms which it contains. It should have neither any fat abstracted, nor any water added. It should be free from chemical preservatives. The addition of boric acid or formaldehyde delays “souring” by retarding the multiplication of the lactic acid bacillus. Neither of these drugs, except in dangerous quantities, can destroy some of the more deadly organisms, still less do they affect the spores. Hence, milk thus preserved may be a very dangerous food, although it presents to taste or smell no evidence of harmful chemical changes. Put shortly, no preservatives should be permitted, for they simply enable milk to be delivered as fresh milk, when it is really two or three days old. Possibly, too, they interfere with the secretion and action of the digestive ferments. No colouring matter should be added although the public think that a yellow milk is a good milk. Many a pure white milk is richer in fat than the yellow-tinted milk of certain cows. Most of the yellow milk in towns is simply coloured by the addition of dyes, such as annatto or methyl-orange.

Nor should milk be heated, either at the farm or dairy before delivery. Commercially the processes of pasteurisation (heating to 158° F. for 20–30 minutes), and of sterilisation (heating to 212° F. for an hour), are often imperfectly carried out. In some instances, the heat is only applied to milk, from which a portion of the fat has been abstracted, or to milk which, remains over after the regular delivery, and is consequently

neither fresh nor clean. If milk is dirty to start with, if toxins have been already produced in it, no amount of heat will render it a safe and satisfactory food, and a sense of false security is induced by these measures. Both modes of heating the milk destroy many pathogenic organisms and many harmless ones. Unfortunately it requires a degree of heat and a length of exposure, which are rarely employed, to destroy the dangerous "peptonising" organisms described by Flügge, and the spores of the deadly bacillus of Gärtner, and of the bacillus enteritidis sporogenes of Klein, some of the most important factors in the production of zymotic enteritis. The comparatively harmless lactic acid bacillus is easily destroyed. It is harmless in the sense that, by its rapid multiplication, it crowds out and prevents the growth of many pathogenic organisms, and, by its "souring" effects, it makes evident, even to the unintelligent, that the milk is no longer a fresh and suitable food. "Souring" is visible and unmistakable. Heat prevents it by destroying the lactic acid bacillus, but it does not prevent the decomposition or putrefaction due to other organisms, which can develop in an alkaline or neutral medium. These changes may not be evident to either taste or smell. On the other hand, pathogenic germs are more likely to be destroyed by heat than by waiting for "souring." Heat may be applied to milk in the home under conditions referred to later. Boiled milk will go sour as quickly as unheated milk, unless it is cooled down rapidly and kept in the cold. During slow cooling, a degree of temperature is reached very suitable to the rapid growth of undestroyed lactic acid bacilli and other organisms.

The best milk supply for an infant is the mixed milk of a large number of cows, which are healthy in every respect, have passed the tuberculin test, and are fed on suitable foods. That perennial panacea, "the milk of one cow," presents the maximum degree of variation, whereas mixed milk from a large number of cows maintains a steady average composition. All utensils should be clean, the milker's hands and the cow's udder should be washed, and the milking should be done in as clean a place as possible. The milk should be filtered, cooled down to a temperature of 40° F.—45° F., bottled at the farm, sent up to the town in proper refrigerator vans, and delivered

direct from the station to the consumer. At the home, it should be kept in the cold, and the bottle not opened until wanted. At present there is little prospect of getting such a milk supply, and we must deal with the milk as we do get it. Recently bottles have been made of compressed paper, manufactured from spruce pulp, and, as they can be made so cheaply that they can be destroyed after being once used, it is possible that some enterprising firm will undertake the supply of milk on the lines above indicated.

Management of the Milk.—Get the milk twice a day from a big dairy company. As soon as it is delivered, put it into a tall, narrow, cylindrical vessel or jug, covered with muslin to keep out dust, and place it in the coolest available spot, such as a refrigerator surrounded by ice, in a bowl containing ice, in a cold cellar, or on the outside ledge of a window with a north aspect.

After it has stood for a period of one to three hours, according to the directions of the doctor, the top half or top third must be ladled or syphoned off into another jug, and retained for use. A suitably graduated, glass, containing vessel can be obtained, fitted with a stop-cock at the bottom, through which the lower portion of the milk can be drawn off, or the stop-cock can be fitted half-way down. The disadvantage of having the stop-cock at the bottom is that, while standing, particles of dirt sink to the bottom and stick to the sides. Hence, when the bottom milk is drawn off, some of the dirt is retained in the portion kept for use. If the stop-cock is half-way down, the apparatus is more difficult to keep clean, and it is rather more complicated to do more than halve the milk, whereas in the other arrangement any proportionate division can be devised.

Composition of Milk.—For the purposes of easy calculation, the percentage of the various constituents in human milk may be taken as : Proteid 2, Fat 4, Sugar 6·6 ; and in cows' milk as : Proteid 4, Fat 4, and Sugar 4·4. Strictly the proteid in human milk varies from 1-2 per cent., being rarely less and occasionally more ; and that in cows' mixed milk varies from 3·5 to 4·0 per cent. A more important difference between the two fluids is in the relative proportions of the two proteids, caseinogen and albumin, in each of them. In human milk, the

caseinogen bears to the albumin a proportion of about 1 to 2 ; in cows' milk the proportion is about 4 to 1. In practice, it is found necessary to dilute cows' milk with about four or five times its bulk of water, in order to obtain with acetic acid a curd like that produced by adding this acid to human milk. Realising these differences, it is clearly impossible to make, by any process of dilution of cows' milk, a fluid identical in composition with human milk. Apart from the proteid difficulty, there are differences in the size of the fat globules, and possibly differences in the composition, of the fats and sugars. Nevertheless, with proper management, the results are very good, and, in point of excellence, are only surpassed by breast feeding.

The Preparation of the Food.—Stand the milk for three hours and separate the top milk. It will be found that the cream has risen into the top half, which therefore contains about 8 per cent. of fat, and the usual percentages of proteid and sugar. In order to find the appropriate diet for a baby, begin with a weak food. The dangers arising from insufficient food are infinitesimal in comparison with those due to over-feeding in quality or quantity. For an infant under three months of age, the proteid should not at first exceed 1 per cent. Take, therefore, 5 ozs. of top milk, 1 oz. of lime water, and 14 ozs. of water. Add to this 6½ drachms of sugar (equivalent to an addition of 4 per cent. to the mixture). The mixture then will contain about 1 per cent. of proteid, fat 2 per cent., sugar 5 per cent., and is suitably alkaline.

If the mixture is well digested, the strength can be gradually increased by adding 1 oz. of top milk, and subtracting 1 oz. of water, once or twice a week, until the mixture consists of top milk 10 ozs., lime water 1 oz., water 9 ozs. Its composition will then be : proteid 2, fat 4, sugar 6 per cent., in slang parlance, as near as makes no matter. Now supposing more fat is required in the food, all that is necessary is to use the top third, or the top fourth, in making the mixture. The other constituents will remain of practically the same proportions. If more proteid and less fat are wanted, the top two-thirds, or some similar quantity, can be used. Thus, it is obvious that with very little trouble, and with quite sufficient accuracy, the diet can be altered in details in any particular case, provided

that a milk of fairly steady average composition is used daily that it is allowed to stand the same length of time under approximately the same conditions, and that the instructions given are clear and definite, and accurately carried out.

Should this Milk be boiled ?—The answer to this depends on many circumstances, such as the freshness of the milk, the possibilities of contamination, the fear of tuberculosis, the home conditions, and the intelligence of the child's attendants. If the supply is of doubtful purity and freshness, if the weather is hot, if the nurse is stupid, it is advisable that each feed should be boiled before being given to the child, the lime water being added afterwards. As a general rule, if the milk has been kept in the cold, it is sufficient to add the amount of milk for each feed to the necessary quantity of boiling water. For pasteurisation or sterilisation, the mixture should be divided into a sufficient number of feeds for 24 hours, each feed put in a bottle stoppered by sterile wool, and the whole heated in a suitable apparatus.

Though personally, I am little afraid of the spread of tuberculosis from cow to child through the medium of tuberculous milk, the matter is still *sub judice*, and at present it must be regarded as a possibility. Local authorities should prevent the distribution of such infected milk, rather than that the consumer should be forced to lessen its nutritive value by heat.

Heat is injurious to milk as a food. The longer milk is heated, the greater is the loss of its anti-scorbutic properties, the greater is the impairment of its nutritive value, and the less readily is it coagulable by rennet. The loss of anti-scorbutic value can be counteracted by giving fruit juice. An increase in quantity counterbalances the lowered nutritive value. The loss of coagulability by rennet is often an advantage. I have shown that by heating milk, for varying periods of exposure, to various temperatures up to 120° C., the loss of coagulability is much increased. Even when curds are formed, they are soft and pass readily through the pylorus. This is the explanation of the fact that it is possible to feed even very young infants on sterilised milk with impunity. Gastric digestion is improved to the extent that the juices can

mix more easily with the uncurdled milk, but digestion becomes mainly intestinal.

Effects of Alkalies.—Human milk must be regarded as alkaline, though it gives a faintly acid reaction with phenolphthalein. Cows' milk is highly acid when it reaches the baby. The addition of an alkali makes the milk more analogous to human milk, and, by neutralising the acid, renders it much less coagulable by rennet. Lactic acid causes the formation of tough curds in the stomach. An alkali prevents the formation of these curds, and, if added in just sufficient quantity, the action of rennet is unaffected. An excess makes curdling by rennet defective. Thus the effect of adding alkali is much the same as that of heat. Digestion becomes intestinal rather than gastric. Lime water is the best alkali, and its supposed constipating effects are, in my opinion, a myth. Bicarbonate of soda is often used, and is said to counteract the tendency to constipation in the bottle-fed. The carbonic-acid gas, to which it gives rise in the stomach, permeates any curd formed, and makes it lighter and more easily infiltrated with gastric juice. Citrate of soda also prevents curdling by precipitating some of the lime salts present in the milk. It should be used in the proportion of 1 grain to an ounce of milk.

Time Table.—The babe should be fed regularly from 5.0 a.m. to 11.0 p.m., or from 6.0 a.m. to 12.0 midnight. Sleep must not be allowed to interfere. Each feed should take from 15 to 20 minutes. Ten feeds should be given daily in the first month at intervals of 2 hours; eight feeds at intervals of $2\frac{1}{2}$ hours in the second month; and seven feeds at intervals of 3 hours after this time. After the sixth month, if the child is doing well and taking a nutritious food, the number of feeds may be reduced to six at intervals of $3\frac{1}{2}$ hours, and later, to five feeds at intervals of 4 hours.

Quantity.—At birth, the babe requires for a feed an amount equal to 1 per cent. of its weight, and the quantity is increased steadily, but fairly rapidly, during the first two months. A simple and useful table is the following :—

FIRST MONTH.

The Quantities are given in Drachms.

Week of Life.	One.	Two.	Three.	Four.
Milk - - -	2	3	4	5
Cream - - -	1	1	1	1
Water - - -	5	6	7	8
Lime water - -	1	1	1	1
Sugar - - -	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$

Instead of milk and cream, an equal quantity of the top third or top quarter of milk, stood in the cold, can be used.

During the second month, each feed should consist of 1 ounce each of top milk and water, 3 drachms of lime water, and 1 of sugar. From the age of two to six months, each feed should consist of 3 to 4 ozs. of equal parts of top milk and thin barley water, or a like amount of water and lime water instead of barley water. After this, each feed must be increased to 5 to 6 ozs., the proportions remaining the same. This diet scale suits the average infant, but often needs modification. No diet sheet can be written out which will suit every babe. The quantity and quality of the food vary with the age, weight, development, health, external temperature, and idiosyncrasy of the child. Just as the milk of different women varies, so do the appetite and digestive capacity of the child. Both the quantity of food and the proportion of milk to diluent have to be increased for many infants. It is astonishing what a large amount of food some need and digest. It is equally astonishing on what a limited diet others will be satisfied and gain weight. It is better to err on the side of giving too little than giving too much. One rarely sees in consultation a bottle-fed baby suffering from an insufficient food supply, whereas the effects of over-feeding are only too common. The feeding of infants is an art, but an art on a scientific basis, the knowledge of the composition of foods, and of the processes of digestion.

Cream is of two kinds, "gravity" cream and "separator" or "centrifugal" cream. The former is of variable strength,

and cannot be perfectly fresh. Often it is the only kind available. It should be skimmed from the surface of milk by the same person at the same time of day. It contains from 15 to 20 per cent. of fat. Centrifugal cream is a thick, somewhat glutinous fluid, containing 40 to 50 per cent. fat, or prepared to contain any required fat percentage. I do not like it as well as gravity cream, though the process of separation gets rid of the dirt. I do not think it mixes as well with milk, and preservatives are often added. Necessarily, with high fat percentages, there is a decrease in the proportions of protein and sugar. On account of the difficulties in getting satisfactory cream, I much prefer the use of home-separated top milk.

Percentage Feeding.—A pseudo-scientific system of infant feeding has been largely advocated. It was first introduced in America, and arrived in this country some years ago. In this method, scientific accuracy in percentage composition is a great consideration. A prescription for a milk-mixture is written, and sent to a milk laboratory, or to one of the big dairy companies, most of which supply mixtures on this system, *e.g.* :—

B. Albumin	-	-	-	-	0.50
Caseinogen	-	-	-	-	0.25
Fat	-	-	-	-	0.20
Sugar	-	-	-	-	5.00

Alkalinity 5 per cent. Heat to 158° F. for half an hour.
10 feeds of 1½ ozs. each.

The food is delivered in bottles, each containing enough for one feed, plugged with sterile wool. It is delivered once a day, and, perhaps, not at all on Sundays.

There are many objections to the system, although it is claimed that it is exact, that the composition of the food can be modified in any direction, and that, on such minute modifications, success in infant feeding depends. It has quite as much effect on the minds of the parents as electropathic belts and such like remedies. It makes infant feeding appear such a simple matter, that its management passes into the hands of nurses and laboratory officials, and a new universal food is

created, which justly competes with other manufactured foods for infants.

In my experience, it is not nearly so satisfactory as the home-modification of milk, and I have known the food actually delivered in a state of decomposition. From the scientific point of view, it must be remembered that human milk varies very considerably in different women, in the two breasts of the same woman, at different periods of the day and of the same nursing. Surely, nature obviously teaches us that pedantic accuracy in composition of the food is not desirable. It is a method of feeding I have characterised as the "*toujours perdrix*" diet. To feed an infant on the same amount of food at each meal, of the same composition, subjected to the same degree of heat, and of the same degree of alkalinity, is to treat it as a machine, and its stomach as a test tube. No doubt excellent results can be sometimes obtained by this system, but equally good ones are got by intelligent feeding on simpler and less expensive lines. I have long discarded the method in favour of the home-modification of milk, but I believe it is still advocated by some enthusiasts. The relative proportions of albumin and caseinogen can be prescribed in this system, but, if necessary, they can be almost equally well devised from mixing cream and whey.

Cereal decoctions are used as diluents, often very early in life, although the diastasic power is small or absent. Probably, even in the first month, a small part of the starch can be converted by the warmth and moisture. During the first six months, the diastasic powers are small, and they are not fully developed until the end of the first year. Human milk contains no starch, and the presence of a starch digesting function does not warrant it being used, though it can be made use of in moderation. In practice, the addition of barley water instead of water is valuable for its soothing effect on the mind of the mother, who has great belief in the nutritive value of barley water, and thinks her child is being starved on a diet of milk and water. Barley water has little, if any, more effect on the curdling of milk than a like quantity of an equally alkaline water. It may be given after the second month in a very weak solution, and, after the sixth month, it can be gradually thickened, thus slowly teaching the digestion to deal with

starchy food. If the child is constipated, oatmeal water can be used, and rice water if the bowels act too freely. Oatmeal is the richest of the cereals in fat, while rice is practically fat-free.

Sometimes starchy foods are not as well digested as plain milk and water, giving rise to flatulence, and frothy, undigested stools.

Sugar.—So far I have not referred to the kind of sugar. Milk sugar, though not always pure, is the most like the sugar of human milk, and may be used entirely. If only a small quantity of sugar is added, there is no objection to cane sugar. If a large amount is needed, it is better to use milk sugar, or equal parts of milk sugar and cane sugar, as otherwise the mixture is too sweet. An exaggerated controversy has raged around the question of the cane sugar *versus* milk sugar. In practice, it is found that the former can be used without injurious effects, unless it is given immoderately. Being cheap, easy to get, palatable and sweet, it is often given in excess. Milk sugar is hardly within reach of the poor.

The Milk of Other Animals.—Only the ass and the goat need be considered. The milk of the ass is very like that of the woman, but is deficient in fat. It can be got in London, is expensive, and does not need dilution or boiling. Goat's milk is like cows' milk, and has no special virtues. In country districts, where cows' milk is not available or the milk supply is unreliable, a goat can be kept, fed on a suitable diet, and its milk modified on the same lines as cows' milk. It has rather an unpleasant smell, which is got rid of by boiling.

The Feeding of Infants during Illness.—In various disorders of the intestinal tract, in marasmus of a certain degree of severity, and in other affections, it may be inadvisable to give ordinary milk. Weak, nutritious, easily digestible foods are often necessary.

1. *Whey.*—This is made by coagulating skimmed or separated milk by rennet. It is better not to use liquid preparations of rennet, because of their variable strength and the possibility that they have been made with impure glycerine. As the curd contracts, it squeezes out the whey, a thin watery fluid containing from 0·8–1·0 per cent. of albumin and 4·4 per cent. of sugar. The fluid can be made

more nutritious by breaking up the curd with a fork, and squeezing it through fine muslin. It is very useful as a temporary food in alimentary disorders, marasmus, and typhoid fever. By gradually adding cream or milk, a return to an ordinary milk mixture can be slowly carried out. Before making such addition, the whey must be heated to a temperature of 150° F., to destroy the rennet ferment without coagulating the albumin.

2. *Peptonised Milk* is also very useful. It is best prepared by the use of the Allenbury or Fairchild's peptonising powders. At first, it should be peptonised from 20–30 minutes, and given diluted with an equal quantity of water. Subsequently, the length of peptonisation is reduced as the child improves.

3. *Albumin Water* is a valuable, pure, albuminous fluid, made from the white of egg, with 6–8 ozs. of water and a pinch of salt. It can be sweetened by sugar. Albumin water, sugar and cream, mixed in suitable proportions, make an artificial mixture which resembles human milk.

By the intelligent use of the above foods and the plain cereal decoctions, it is quite easy to bring up infants successfully, without having recourse to laboratory mixtures, or to any of the death-dealing condensed milks and proprietary foods. For the normal infant, the latter are absolutely unnecessary, but I freely admit that there are cases of disease in which they are valuable, when used with discrimination by those, who thoroughly understand the art of infant feeding.



ON THE USE AND ABUSE OF CONDENSED MILK AND PATENT FOODS IN INFANT-FEEDING.

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It might seem rash, in these days of municipal infant-feeding and laboratory modification of fresh cow's milk, even to imply that condensed milk and patent foods may have their uses as well as their abuses in infant-feeding; and, indeed, seeing, as anyone may do almost daily at any children's hospital in London, the disastrous results of condensed milk and patent foods, one might well believe that such preparations should be condemned unconditionally and without exception.

But I venture to think that such condemnation would be too sweeping, and I would even say that there are few of these various brands of condensed milk, or proprietary foods which may not occasionally be of value, if used with an intelligent appreciation of their composition and properties, and, therefore, of the conditions under which they are suitable. Unfortunately it is just this knowledge which is necessarily lacking in the non-medical public, and so long as any and every enterprising speculator can advertise his condensed milk, or his infant's food, for indiscriminate use by the laity, so long will a vast amount of needless misery and suffering be inflicted upon infants.

The exact composition of each of these preparations, whose name is legion, it is impossible to retain in the memory; but it is certainly possible for any medical man to know the chief features of all the preparations which are in common use. These various foods fall into two groups, I., those intended as substitutes for fresh cow's milk, and II., those intended as additions to cow's milk.

These are usually further classified in some such way as this:—

- I. (1) Condensed milk.
- (2) Dried milk with cereal—starch completely converted: Allenbury, Nos. 1 and 2; Horlick's Malted Milk.

- (3) Dried milk with cereal—starch partially converted :
Carnrick's Soluble Food ; Milo Food.
- II. (4) Cereal—starch completely converted : Mellin ;
Hovis Baby Food No. 1.
- (5) Cereal—starch partially converted : Allenbury Food
No. 3 ; Bengers Food ; Savory and Moore's Food.
- (6) Cereal—starch mostly unconverted : Ridge's Food ;
Neave's Food ; Frame Food ; Robb's Biscuits ;
Chapman's Wheat Flour.

It will be seen that only those foods, mentioned under groups (1), (2), and (4), are free from starch ; and the question arises whether any starch is permissible to an infant below the age of eight or nine months. My own experience leads me to think that even such a small amount of starch (1—2 per cent.), as is present in barley water, is often harmful, and that all foods containing any starch whatever should be avoided until the infant is eight or nine months old, and even then starch-containing foods should gradually be only introduced, so that, by the end of the first year, the child may be having two meals of starch-containing food in the day.

But the presence or absence of starch is by no means the only point, which determines the suitability or otherwise of a food for infant-feeding, it is too often forgotten that although no starch may be present, many of the proprietary foods as given to the infant, contain a proportion of carbohydrate, which is greatly in excess of that present in human milk. In the Allenbury Foods, No. 1 and No. 2, for instance, the proportion of carbohydrate, when the food is diluted according to the maker's directions, is 10—11 per cent., that is half as much again, as the percentage present in human milk ; while Horlick's Malted Milk contains nearly 12 per cent., when four teaspoonfuls of the food are diluted with eight tablespoonfuls of water as directed. Undoubtedly, there are infants who will tolerate, and even thrive upon, a food containing more than the breast-milk standard, 7 per cent., of carbohydrate ; but it is equally certain that there are many infants who suffer from flatulence, discomfort, and looseness of bowels whenever this proportion is exceeded, even to a very slight degree.

But here I wish to emphasise a general principle of the greatest importance in infant-feeding, namely, that the suitability of a particular food for prolonged use, is not proved by

the mere fact that it is taken well, and produces no immediate ill effects. The evil results of unsuitable food may not appear until the food has been continued several weeks or months, indeed in the case of rickets, or scurvy, the food which has produced the disease has often appeared to suit excellently, so far as freedom from obvious digestive disturbance is concerned. It seems likely that excess of carbohydrate, when continued for several months, has some such slowly produced effect, favouring the ultimate onset of rickets, probably by interfering in some way with the assimilation of fat.

And this brings me to another very serious fault, which is common to many of these trade preparations as given to the infant, namely, deficiency of fat. My own observations support the views put forward by Dr. Cheadle that the chief dietetic factor in the production of rickets, is deficiency of fat-assimilation; a deficiency usually dependent upon deficiency of fat in the food, but occasionally—so it appears—due to defective assimilation of the fat which is present in the food. The whole process of fat-assimilation, and the part played in metabolism by fat taken as such in the food, is still very imperfectly known, but there is experimental evidence to show that the assimilation of one food-constituent is influenced by the proportion of other food constituents present in the diet, and there are clinical facts which suggest strongly that excess of carbohydrate, whether soluble or insoluble, interferes with the assimilation of fat. Whilst therefore deficiency of fat is in itself a serious fault, the deficiency probably becomes even more harmful, when associated with excess of carbohydrate, and it seems likely that a proportion of fat, which is just sufficient to prevent disorder of nutrition, so long as no excess of carbohydrate is present, may become insufficient, when its assimilation is hindered by an associated excess of carbohydrate.

But what constitutes deficiency of fat? Obviously no hard-and-fast rule can be laid down, but if the occurrence of rickets may be taken as an indication, in most cases, of deficiency of fat in the diet—an assumption which has yet to be proved, but which affords, I think, the most useful working hypothesis—then it would appear that, for an infant six or seven months old, 1·5 per cent. of fat is not sufficient to

safeguard from rickets, while with 2 per cent. and occasionally even with 2·5 per cent., especially if therewith the proportion of carbohydrate is excessive, slight rickets is not uncommon. Any proportion below 3 per cent. must be considered unsatisfactory for continued use, although some infants will thrive with a percentage of fat which never quite reaches 3 per cent. A glance at the published analyses of the various foods, which are advertised as substitutes for fresh cow's milk, and which are intended to be used, simply diluted with water, will show that not one is free from the faults mentioned :—

	Fat.	Carbohydrate.
Allenbury, No. 1 -	16·7 per cent.	66·6 per cent.
„ No. 2 -	14·9 „	68·7 „
Horlick's Malted Milk -	8·4 „	63·5 „
Milo Food -	4·4 „	77·7 „
Carnrick's Soluble Food -	2·5 „	76·2 „
Condensed Milk (Nestlé's)	13·1 „	54·2 „

It is evident that no dilution can so adjust these proportions as to make the percentage both of fat and carbohydrate correspond with the standard of human milk ; as a matter of fact, in nearly all cases as the food is used, the fat is deficient, often extremely deficient, and the carbohydrate is considerably in excess.

There is yet another point, which must be remembered in comparing these manufactured products with human milk, or fresh cow's milk, namely, that a statement of percentage composition, although it affords some guidance, gives but an incomplete, and sometimes misleading, description of a food. For instance, two foods may contain a precisely similar percentage of fat and yet differ in their fat-value. Compare a dried milk food with a dilution of fresh cow's milk containing the same percentage of fat : in the latter, the emulsion of fat is extremely fine and the fat is easily assimilable, in the former, the emulsion is so imperfect that, even before the infant has time to finish his feed, the fat has risen in yellow droplets floating on the surface, a fault which, in some cases, seems to interfere considerably with the assimilation of the fat, part of which indeed is apt to remain coating the sides of the bottle. On the other hand, compare a dried milk food with a

dilution of fresh cow's milk in which the percentage of proteid is the same ; the proteid in the former produces so little curd, that an infant may assimilate it easily, when he is unable to digest the curd of the fresh cow's milk. Percentage composition tells us nothing of the subtler changes, whatever they may be, by which the nutritive value of a food is so impaired in the process of manufacture that, if continued for some months, it is liable to set up all those serious symptoms which constitute scurvy, and which sometimes end in death. And let it be remembered that a small amount of fresh cow's milk mixed with a patent food, does not necessarily safeguard the child from scurvy. In some of the cases of infantile scurvy under my own care, Savory and Moore's Food or Benger's Food was being used with fresh cow's milk.

But in spite of their faults, these preparations are useful under certain conditions. One hears often enough of the infant who "couldn't take fresh cow's milk" so it was put on condensed milk, and straightway its digestive troubles mended ; and if only the condensed milk had been stopped, after two or three weeks, no harm would have been done, but it has been continued for two or three months, and now the child has rickets. What has happened ? The infant was probably tried at first with a mixture of milk and water, 1 : 2, perhaps, even, equal parts ; and he was sick, or had colic, so resort was had to condensed milk ; a teaspoonful in 4 ounces or even in 6 or 8 ounces of water. The following figures will show how such mixtures compare with the milk previously tried.

Condensed Milk.		Fresh Milk.
One teaspoonful to 4 ozs.	One teaspoonful to 6 ozs.	1 to 2 parts.
Proteid - .9 per cent.	.6 per cent.	1.2 per cent.
Fat - 1.1 "	.75 "	1.2 "
Sugar - 4.5 "	3.2 "	1.3 "

(+ added sugar).

It is evident that the condensed milk in these mixtures, which are commonly in use, is diluted, especially as to the proteid, which has nearly always been the cause of the difficulty with fresh milk, to a degree which was never tried when the fresh cow's milk was given. I have seen cases, in which condensed milk has been given in the strength of a teaspoonful

to 8 ozs. of water, (Proteid .45 per cent., Fat .5 per cent.) because "fresh milk would not agree": the fresh milk had never been diluted with more than an equal quantity of water, whereas the dilution of the condensed milk was equivalent, so far as proteid was concerned, to one part of fresh milk with seven parts of water! It would probably be correct to say that in a large proportion of the cases, in which an infant is supposed to be unable to digest fresh cow's milk, whereas it can digest condensed milk, the difference depends far less upon any special digestibility of the curd of condensed milk than upon the simple fact that it is diluted to a degree, which was never tried with the fresh milk.

In calculating the strength of a condensed milk mixture, it must of course be remembered that a domestic teaspoonful is not a drachm, and that, if the spoon be dipped in the can, there is further allowance to be made for the viscid milk which clings to the undersurface of the spoon. For purposes of calculation, I have ascertained by experiment that if an average teaspoon (capacity about 3 iiss) be used, by dipping it in the can, and taking up as much as can be withdrawn without special care, the condensed milk may be reckoned as approximately 3 iij., with a larger teaspoon (capacity 3 iij.) the condensed milk should be reckoned as fully 3 iv., whereas, if the milk is poured from the can into the teaspoon, so that none adheres below, the amount held by the average teaspoon should be considered 3 ij. The undiluted condensed milk contains approximately, proteid 11 per cent., fat 9 to 13 per cent. (9 per cent. Milkmaid, 13 per cent. Nestlé's), sugar 55 per cent.; so that, for instance, with an average teaspoonful to 3 oz. water, the mixture is 3 drachms to 24 drachms, = 1 to 8 or 1 in 9, that is, proteid 1.2 per cent., fat 1-1.5 per cent., sugar 6 per cent. As a ready way of calculating approximately the strength of a condensed milk mixture, this is, I think, sufficiently accurate to be of practical value.

One thing is clear with regard to condensed milk and the other substitutes for fresh cow's milk, that no manner of simple dilution with water can make the resulting mixture a suitable food for prolonged use for infants; simple arithmetic shows that either the carbohydrate must be excessive, or the fat must be extremely deficient. Nevertheless, these

foods may be of value for short periods under special conditions. Diluted sufficiently to reduce the carbohydrate approximately to 7 per cent. or less, they may be of use temporarily in cases where there is great intolerance of the curd of fresh milk; only let it be ascertained that the fresh milk tried has been diluted sufficiently before it is assumed that the baby "cannot take fresh milk," usually the addition of at least three parts of water would be necessary to make the fresh milk as weak in proteid as is the patent food, which is supposed to be so much more digestible.

There can, I think, be no doubt that, in the dried-milk preparations (in Group I.) and to a less degree in condensed milk, the proteid is more easily digested than in fresh cow's milk, but it must be remembered that the same result may be attained, by the peptonisation of fresh cow's milk without the disadvantage of necessarily giving either excess of sugar or deficiency of fat, and with the advantage that the transition from peptonised to unpeptonised milk can be made as gradually as may be necessary, by simply reducing the time of peptonisation. Peptonised milk, is of course, open to the same objection as the patent foods, that it is a scurvy-producing diet, and, unless guarded by the addition of raw meat juice or some other anti-scorbutic to the diet, it should not be continued for more than a few weeks. The addition of sodium citrate to fresh cow's milk (in the proportion of 1 grain to each ounce of milk), has not even the objections which might be urged against peptonised milk; it certainly reduces considerably the difficulty in digesting curd, and is an expedient, which is well worthy of trial, before having resort, even temporarily, to any condensed milk or patent food.

Another reason, assigned for the temporary use of the trade preparations, is the diminished risk of bacterial contamination in these foods, which have been manufactured by a process which destroys bacteria. In dirty crowded tenements, with little possibility of proper storage and less of intelligent care, I think this may be a valid reason for their use during the few weeks of hottest summer when diarrhoea is most prevalent, but for the majority of hospital out-patients, and, *a fortiori*, among the well-to-do, who will exercise reasonable care in the use of fresh milk, I doubt if the increase in safety from infection is

sufficient to outweigh the risks, which may arise from the faulty composition of all these patent preparations. It is to be hoped that, with improvements in the milk-supply, this reason for the use of condensed milk and the patent foods may soon disappear.

The starch-containing patent foods are useful sometimes for infants over nine months of age, when starch is gradually to be introduced into the diet, but apart from the widespread and mischievous abuse of these foods for infants under that age, the mistake is often made of ordering them too unservedly for these older infants, who might profitably take such a food once or twice daily, but who are almost sure to suffer with some digestive disorder if the starch-containing food is given at every meal.

These foods, like barley-water, are sometimes added to milk for younger infants, in order to increase the digestibility of the milk by diminishing the firmness of the curd, a method which is not only harmful for the reasons already mentioned, but also entirely unnecessary; the same object is much more effectually accomplished by the use of sodium citrate in the milk, or, in still more difficult cases, by peptonising.

Lastly, I would point out that upon the medical profession there rests no small responsibility in such a matter as the use and abuse of condensed milk and patent foods for infants. Useful as most of these may occasionally be, the lay public, even if not misled by advertisements, has not the requisite knowledge to discriminate between the different conditions under which different foods may safely be used in infant-feeding. The doctor's orders, unless most carefully guarded and hedged about with cautions for each particular case, are apt to be taken as a general sanction for the particular food ordered. We may well, therefore, be careful in our advice, lest we should seem to countenance the indiscriminate use of these trade-preparations, and thereby add to the deplorable suffering, which such ignorant use brings upon infants. Of this I feel sure that the more the medical man knows of the many simple methods of adapting fresh milk to the needs of the infant, the less use he will find for condensed milk or patent foods.

THE MUNICIPAL FEEDING OF INFANTS.

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THE prevention of infantile mortality is probably the most pressing problem that now confronts the practical workers in preventive medicine. The conception of disease as something eminently preventable and to be prevented, has become widely diffused during the last 50 years in this country, and, finding expression in legislative and administrative measures, has borne fruit in the triumphant reductions of mortality, which are recorded year by year in the official reports of the Registrar-General. Amongst these triumphs, however, one looks in vain for a substantial reduction in infantile mortality. During the five years 1896-1900 the proportion of deaths, under one year per 1,000 births, was as high as in any previous quinquennium, and indeed the highest infantile mortality figure, recorded in any year in the last century, was reached in 1899, when the proportion of infant deaths per 1,000 births was no less than 163. It is becoming apparent that the ordinary methods of "sanitation" are inadequate to overcome the adverse influences, which menace the early months of life, and that the field of preventive medicine must be extended, if we are to deal effectively with the difficult, complex, and supremely important problem of infantile mortality.

The causes of infantile mortality are exceedingly numerous and varied, and it will be necessary to effect a much more searching analysis, than anything hitherto attempted, before we shall be in a position to make a precise statement as to their relative importance. At the present time there is, perhaps, too great a tendency to concentrate attention on improper feeding, to the exclusion of factors, which are possibly equally important, such for instance as the adverse conditions affecting the child during its ante-natal existence. Still, it cannot be denied that improper feeding is a very considerable factor in infantile mortality, and, owing to the unfortunate decline in breast feeding, it is a factor whose importance is

likely to increase. It is to the prevention of the enormous waste of infant life due to improper feeding, that our sanitary authorities have chiefly directed their more special methods of prevention. The circulation of advisory literature has been undertaken by many municipalities. In Manchester, for instance, it has been the practice for some years for the local registrars to hand to every person, registering a birth, a leaflet containing simple practical instructions in infant feeding, and a similar leaflet has been distributed to every house in the city four or five times during the last few years. Manchester, too, was the first town to organise the system of domiciliary visitations by health visitors, which has since been adopted in many other districts. Health visitors are employed for various purposes, but certainly their chief duty is to give, under the direction of the medical officer of health, practical instruction in infant feeding.

It is evident, therefore, that the regulation of infant feeding is now regarded as a matter, coming within the scope of the municipal organisation for the protection of the public health, and this view receives additional confirmation from the fact that several of our municipalities have taken a further step in this direction, by establishing dépôts for the supply of specially prepared infants' milk. The work of these dépôts has been grievously misunderstood. By many, the municipal infants' milk dépôt is regarded merely as a step towards a municipal milk supply, as the thin end of a very large wedge of "municipal trading," and the phrases "municipal trading" and "unfair competition" are conspicuous in the discussions of what is after all mainly a medical question. What the municipal infants' milk dépôt really does represent is not a development of "municipal trading," but a further step in the direction of municipal supervision of infant feeding. This will be apparent from a consideration of the French organisations, from which our milk dépôts spring, namely the *Consultation de Nourrissons* and the *Goutte de Lait*.

The germ of the idea, which afterwards found expression in the *Consultation de Nourrissons*, may be said to have emanated from Professor Herrgott of Nancy, who founded "L'Œuvre de la Maternité" in that town in 1890. The chief feature of the work of this maternity charity was, that the mothers were

encouraged to attend with their babies a month after delivery, when the babies were carefully weighed and examined, and if their progress has been satisfactory the mother received a substantial present. In the years 1890-1900, 2,052 mothers had passed through this institution, and 23,382 francs had been distributed amongst them.

The Nancy maternity charity, however, was but an embryonic form of the *Consultation de Nourrissons*; the first fully developed example was founded by Professor Budin at the Charité Hospital, Paris, in 1892, and two others were afterwards established by him, one at the Maternité Hospital in 1895, the other at the Clinique d'Accouchement Tarnier in 1898. In these institutions, the mothers are encouraged to attend with their babies, not merely on one occasion after leaving the hospital, but every week until the child has completed his second year. Once a week, the child is weighed and examined, and the feeding carefully regulated. Breast-feeding is regarded as a matter of supreme importance, and if, at first, the mother's milk does not appear suitable, the child is not promptly weaned, as is too often the case elsewhere, but the mother's diet and mode of life are enquired into and regulated. When, however, the supervising physician is satisfied that satisfactory breast feeding is impossible, the mother is supplied with sterilised cow's milk, which is supplied in separate bottles for each meal, and is usually given unmodified even to the youngest infants. Breast-feeding is encouraged by gifts of baby-clothes, food, or money, and hand-feeding is quite exceptional. At the Clinique Tarnier during the years 1898-1902, no less than 448 of the 527 children, who were under observation, were fed at the breast. It is obvious that the children, brought to these consultations, start life with great advantages. From the moment of birth, they are under the regular supervision of expert medical advisers, who not only are fully alive to the enormous importance of breast-feeding, but, what is more to the point, who spare no pains to secure successful breast-feeding, and, as might be expected, the mortality of the children is remarkably low.

The *Goutte de Lait* is an offshoot of the *Consultation de Nourrissons*, and is practically a milk dispensary, from which infants are fed under medical supervision upon sterilised milk.

Breast-feeding is encouraged, but usually the great majority of the infants are hand-fed, and in fact the *Goutte de Lait* is mainly intended to succour those infants for whom breast-feeding is impossible. As in the *Consultation de Nourrissons* the babies are regularly weighed and examined, and their progress carefully supervised by the medical director of the institution. The first *Goutte de Lait* was established by Dr. Variot in connection with his Consultation at the Belleville Dispensary, Paris, in 1892, and in 1894 the first provincial *Goutte de Lait*, and the first to exist as a separate institution, was founded in Fécamp by Dr. Dufour, who was the first to give the name "*Goutte de Lait*" to these organisations. During the last few years the *Goutte de Lait* has multiplied exceedingly in France, and many similar institutions have been established in Belgium, Spain, and other countries. The majority are conducted by philanthropic societies, aided by municipal subsidies, but, in some towns, the *Goutte de Lait* is a municipal institution.

The infants' milk depôts, which have been established in this country, may be regarded as imperfect forms of the *Goutte de Lait*. The first depôt was founded by the St. Helen's Corporation in 1899, after a Committee of the Town Council had visited and reported upon Dr. Dufour's *Goutte de Lait* at Fécamp. Similar depôts have since been opened by the municipalities of Liverpool, Ashton-under-Lyne, Dukinfield, Battersea, Leith, Bradford, Dundee, Glasgow, and Burnley, and by two philanthropic societies—the York Health and Housing Reform Association and the Finsbury Social Workers' Union. The following account of the working of the Battersea depôt may be taken as indicating generally the lines upon which these depôts are conducted.

The milk is obtained from a specially selected farm, and is supplied by the contractors under special precautions. It is guaranteed to contain not less 3·25 per cent. of butter-fat, and 8·75 of solids not fat, and to be free from chemical preservatives or colouring matter. Strict conditions as to cleanliness in milking, etc., are laid down. Except for a few weeks in winter, the cows live in the open air, and are milked in the field, and immediately after milking the milk is strained, cooled to below 40° F., and sent to the depôt in sealed churns. On

arriving at the depôt, the milk is again strained, and is then modified, bottled, and sterilised, and cooled as rapidly as possible in a cooling tank. Each child receives from six to nine bottles daily, and the quantity of milk in each is sufficient for one meal and no more. The bottles are supplied in wire baskets, each basket containing one day's supply, and not more than one day's supply is given out on any one day, except on Saturday when Sunday's milk is also supplied. The milk is given to the baby from the depôt bottle through a short rubber teat supplied at the depôt, and, as each meal is in a separate bottle, a "feeding bottle" becomes unnecessary, which alone is no small advantage. The modifications and quantities are set out in the following table:—

Age of Child.	Modifications.	No. of Bottles per Day.	Amount per Bottle.	Amount per Day.
During first fortnight	Milk 1 part, water 2 parts	9	1½ oz.	13½ oz.
" second "	" "	9	2½ oz.	22½ oz.
" second month	" "	9	2½ oz.	22½ oz.
" third "	Milk 1 part, water 1 part	8	3½ oz.	28 oz.
" fourth "	" "	7	4½ oz.	31½ oz.
" fifth "	Milk 2 parts, water 1 part	7	5 oz.	35 oz.
" sixth "	" "	7	5 oz.	35 oz.
" seventh "	Milk practically unmodified	6	6 oz.	36 oz.
" eighth "	" "	6	6 oz.	36 oz.
Over eight months -	" "	6	7 oz.	42 oz.

Cream, sugar, water, and a little salt are added to each modification, and the modifications are varied, so far as possible, to suit individual cases.

At the Battersea depôt, special precautions are taken to ensure that the milk shall not be used to the detriment of breast-feeding. The milk is not supplied unless the applicant can produce a written recommendation from a medical practitioner, and every opportunity is taken to impress upon the mothers that the milk, like all artificial foods, is but an imperfect substitute for mother's milk, and that it should never be used in preference to mother's milk. The homes of the milk consumers are visited by one of the Council's

lady inspectors, who endeavours to secure a proper use of the milk, and the mothers are urged to bring the babies periodically to be weighed. Special attention is now being paid to this part of the work. A room has been fitted up for this purpose at one of the public baths, where the weighing is carried out under the supervision of the medical officer of health. When a child is entered upon the *dépôt* books, the following card of instructions is handed to the mother :—

BATTERSEA BOROUGH COUNCIL.

INFANTS' MILK DÉPÔT.

28, York Road.

1. The infants' milk supplied by the Battersea Borough Council is intended for those infants whose mothers are not able to suckle them. The milk will not be supplied to any mother who is able to suckle her baby but who refuses to do so. Mothers should make every effort to suckle their babies for at least nine months from birth. No artificial food can be anything but a poor substitute for mother's milk. If a mother cannot feed her baby wholly at the breast, she should give the baby as much of her own milk as possible and supplement with cow's milk ; special arrangements will be made for a supply of the infants' milk in such cases.

2. The charges for a full supply of the milk are as follows:—

For children—

Under 6 months old, 1s. 6d. per week, or 3d. per day.

From 6 to 12 „ 2s. 0d. „ „ 4d. „

Over 12 „ 2s. 6d. „ „ 5d. „

For children living outside Battersea an extra charge of 9d. per week will be made.

All payments must be made in advance.

3. The *dépôt* is open from 12 to 5 p.m. on weekdays, and is closed on Sundays and between 1 and 2 p.m. on Saturdays.

4. The milk will be supplied in bottles in a basket, each basket containing a supply of milk for 24 hours, and each bottle containing sufficient milk for one meal and for no more than one meal. Infants under 2 months receive nine

bottles per day ; older children receive fewer bottles, as they should be fed less frequently.

5. If children are sent for the milk, they must be warned not to tamper with the stoppers of the bottles, and on no account to open the bottles.

6. Keep the milk in a cool place.

7. It is most important that the baby should be fed regularly. The milk should be given at the following intervals :—

For a baby under 2 months old :

Give the milk every two hours in the day and every four hours at night.

For a baby between 2 and 3 months old :

Give the milk every two and a half hours in the day and once at night.

For a baby between 3 and 6 months old :

Give the milk every three hours in the day and once at night.

When the baby is 6 months old, the interval between each meal should be gradually lengthened, and the baby may sleep seven or eight hours at night without a meal.

8. On no account should the bottle be opened until the baby is ready to be fed. When feeding time arrives, place the bottle UNOPENED in a basin of hot water for about five minutes. Then open the bottle and put on the teat. The baby should be fed from the depôt bottle. No other feeding bottle may be used.

9. When all the milk in one bottle is not used, the remainder may be given to the other children, but it must not be warmed up again for the baby. Take a fresh bottle for the baby's next meal.

10. No other food should be given unless ordered by a doctor.

11. Immediately after use, the bottle should be well rinsed in clean water, and the teat should be turned inside out, held under the tap and cleansed, and should then be kept in clean water until it is used for the next meal.

12. Breakages will be charged for at the rate of 1d. per bottle, and damage to baskets must be made good. All

bottles, baskets, and rubber rings not returned to the dépôt will be charged full value.

13. It is important that the child should be brought once a week to be weighed. The dépôt is open for this purpose on Tuesdays and Wednesdays from 2.30 to 4 p.m.

14. The presence of infectious disease in a house must be notified at once to the medical officer of health.

15. The milk is supplied on the condition that it will be used in accordance with the directions given above. Should the milk be deliberately misused the supply will be stopped.

It is evident that the work of the municipal milk dépôt is something very much more than a mere handing of sterilised milk over a counter. The dépôt is not a "milk-shop," but the nucleus of an organisation for the feeding of infants under municipal supervision. It is true this supervision is defective, when compared with that exercised in the *Consultation de Nourrissons* and the *Goutte de Lait*, but there is no doubt that our dépôts tend more and more to be conducted on the lines of the French organisations,¹ and we have already seen that the chief feature of the *Consultation de Nourrissons* and the *Goutte de Lait* is not by any means the distribution of sterilised cow's milk, but the regular systematic medical supervision of the infants. By no stretch of language, could the operations of either of these organisations be truthfully described as "trading," nor can this term be used to describe the somewhat tentative beginnings of the British milk dépôts.

The municipal infants' milk dépôt marks a step in the progress of a movement, which is perceptible in other departments of public health work, a movement to extend the sphere of the physician in the collective organisation for the protection of the public health. Preventive medicine has become too much a matter of sewers and drains, and costly isolation hospitals, but there are unmistakable indications that, in the enormously important work of school hygiene, in the control of infectious disease, and in the prevention of infantile mortality, there is an increasing recognition of the value of the more special function of the physician, viz., the separate consideration of the individual human unit. The engineer and the

¹ The Finsbury Dépôt, the latest to be established in this country, is managed on precisely similar lines to the *Goutte de Lait*.

architect work in communities, but upon the physician devolves the far harder task of working in individuals. It is not that we need the engineer and architect less, they have already done splendid work in public health, and have still more fields to conquer. But the protection of the public health, the great act of preventive medicine, is pre-eminently the function of the physician, and in no department of preventive medicine is there a more hopeful field for his activity than in the prevention of infantile mortality.

The continuance of a high rate of infantile mortality is a reproach to our system of preventive medicine, but our French colleagues have shown us the way to methods, which are conceived on right lines, and are destined to be fruitful in results. The supervision of child rearing by an organised body of expert medical advisers, for the purpose not of curing, but of preventing disease, should be the next development of the work of preventive medicine, and in this work would be found a field of splendid promise for the highly skilled ability, which is now largely devoted to the removal of pathological conditions, whose existence a more effective system of public health administration would have prevented.



CONSULTATIONS FOR INFANTS IN FRANCE.

THEIR ORIGIN, ORGANISATION AND RESULTS.

By LEONARD ROBINSON, M.D. (EDIN.), M.D. (PARIS),

Physician to the Hertford British Hospital, Paris.

I. *Origin.*—The honour of creating this new organisation in France is due to Professor Budin, who, when he was at the head of the maternity in the Charité Hospital in 1892, was authorised by the Director-General of the Assistance Publique to form the first consultation for infants.

On asking women, who returned to the maternity for a subsequent confinement, for news of their infant born in the wards, as often as not the reply was : "It is dead." Mothers leave the maternity with their babe in good health, and then, being left to themselves, or to the suggestions of their neighbours and relatives, they commit endless faults and the infant dies. The consultations are destined to induce women, who have been delivered in the maternity, to return to an infant outpatient department that their babies may be watched and the feeding directed. Each mother receives a card, on which are inscribed the date and the number of her confinement in the hospital register, the weight of the infant at birth and on leaving the ward. At each visit, she shows the card, and it is a simple matter to turn up the case and the curve of the daily growth of the infant. The infant is undressed and weighed ; the present weight and the average daily increase being written on the card. Each mother in turn passes before the doctor, who examines the baby, encourages the mother to continue giving the breast, and gives any necessary advice.

When the mother has not enough milk, either through deficient secretion, or owing to illness, Professor Budin advises mixed feeding, as much as possible being given by the breast, and the deficiency made up with sterilised milk ; when the mother has no milk at all, or when she brings back her infant, who has been put out to nurse, and has fallen ill, then only is

the infant fed entirely on sterilised milk ; the quantities of milk prescribed are written down on the register and on the card which the mother keeps.

Infants are allowed to follow the consultation till they reach the age of two years, and have thus passed through the difficult periods of weaning and dentition. The infants are brought every fortnight, when they are breast-fed, but they may be brought every week if necessary ; infants, who receive mixed feeding, or are artificially fed, and receive sterilised milk, come every week.

The consultation, as writes Dr. Henri de Rothschild, becomes a veritable "school for mothers," for if the babies are looked after, the mothers also receive advice and encouragement, and they can compare the appearance and growth of their own with other infants.

The development of these consultations for infants has been very rapid. In 1893 Dr. Variot added one to his dispensary in the poor quarter of Belleville ; Dr. Combey, Dr. Dubrisay, and Dr. Henri de Rothschild followed. In 1895, the Conseil Général of the Department of the Seine, on the advice of M. Paul Strauss, who had been struck by the results obtained by Professor Budin, decided to create similar consultations in the municipal dispensaries and charity organisations in the different quarters of Paris. In Paris alone, there now exist 28 consultations for infants, in connection either with maternities, or with the dispensaries under the Assistance Publique, or organised by private charity.

In July 1894, Dr. Dufour of Fécamp, who did not know of the consultation founded in Paris by Professor Budin, organised an institution to which he gave the happy and suggestive name of "Goutte de Lait." His object was to fight against the excessive mortality of the infants in Fécamp, who are artificially reared, especially among the poorer classes ; the mothers receive good sterilised milk, which Dr. Dufour previously modifies to resemble human milk. All the infants in the town are admitted, and Dr. Dufour divides them into three sections : a free section for the poor, a working-class section, which pays half-price, and a section for the children of the rich and the *bourgeoisie*, who pay full price. Those who are well off must help those who are not.

Consultations for infants and "Gouttes de Lait" are now being founded throughout the provinces, in towns and country districts, in the colonies, and abroad.

II. *Organisation*.—"To create a consultation for infants," writes M. Jonnart, "three things suffice: a pair of scales, an apparatus for sterilising milk, and the devotion of a doctor."

The organisation of consultations and "Gouttes de Lait" is generally very simple, and, reduced to their essential elements, the expense is relatively slight. As a rule, three rooms only are required: (i) a waiting-room, well ventilated and large enough to hold the usual number of mothers who attend the consultation; the furniture consists of forms or chairs; (ii) a room in which to weigh and examine the infants; the furniture consists of a table on which stand the scales, a second table for the doctor and his assistant to write at, and a few chairs; (iii) a room exclusively set aside for the milk and its distribution. The fitting up is very different, when the milk distributed has been sterilised commercially, and when it is sterilised in the consultation itself. In the first place, the room becomes a simple *dépôt* in which the bottles of sterilised milk are placed for distribution. In the second case, the room is much more important and becomes a regular laboratory of sterilised milk, which, although very simply fitted up, must be planned with great attention to detail.

The milk must be of good quality from healthy cows, with no cream extracted and no water added. The milk, furnished by the Assistance Publique in Paris, is controlled daily, and contains 38 to 40 grams of fat per litre. In the Consultations for infants, connected with Maternities and Dispensaries under the Assistance Publique, the milk is sterilised daily by heating in a water-bath of boiling water during 45 minutes; a Soxhlet apparatus is used, containing a number of small graduated bottles, each holding the quantity necessary for one feed. The milk should be consumed during the 24 hours, the mother coming or sending each morning for the day's supply; it is thus easy to avoid over-feeding at any single feed and also during the day.

In the majority of dispensaries organised by private charity, when the milk supply is at a distance and uncertain, and

when the quantity distributed is large, then, commercially, sterilised milk is to be preferred ; this is the method followed by Drs. Variot, Comby, Bresset, Henri de Rothschild, and others in Paris.

When the milk-supply is close at hand, and when the milk is of good quality and a large quantity is not required, it is better to sterilise it at the dispensary, either in a Timpe-Hignette steriliser, as is done at Fécamp, Havre, and Rouen ; in the Soxhlet apparatus, or its modifications, as is done at the maternities and dispensaries of the Assistance Publique in Paris ; or by means of pasteurisation, as at Saint-Pol-sur-Mer and Beauvais. It is necessary to add that the "Goutte de Lait" at Saint-Pol is exceptionally placed, as, thanks to the liberality of its founder, M. van Cauwenberghe, the organisation is perfect ; it possesses its own cows, which are carefully looked after ; the milk is of the best quality and is collected aseptically ; it is pasteurised immediately after the milking, and is consumed in the 24 hours.

Sterilisation renders the casein more digestible, and experience has shown that at least when infants are in good health, sterilised milk may be given pure without causing any digestive disturbance. Dr. Comby uses milk commercially sterilised, and distributes 3,500 to 4,000 bottles every year ; he writes that this milk is perfectly well tolerated by the youngest infants, and that dilution is but rarely necessary. Dr. Variot, who is a strong partisan of pure milk, declares he would not dare to give it absolutely during the first six weeks after birth. The most prudent course would be to commence by following Dr. Marfan, who adds one-third of water and 10 per cent. of sugar. Dr. Dufour, of Fécamp, distributes sterilised maternised milk, *i.e.*, cows' milk, to which he has added per litre two-thirds of water, 15 grams of fresh cream, 35 grams of lactose, and 1 gram of sodium chloride. As a general rule, all the different special preparations of milk are considered inferior to pure natural sterilised milk.

Each consultation must contain an apparatus for washing, cleaning, and drying the empty bottles returned daily by the mothers. One person is generally sufficient to prepare the milk and cleanse the bottles.

It is necessary also to have (*a*) a large register in which are

entered all the details about each infant, the state of health, weight at each visit, &c. ; (b) cards to give to the mothers, who bring them at each visit : on each card are inscribed, every week, the weight of the infant, the difference in comparison with the previous weighing, the average daily increase, the number of bottles of sterilised milk it is to receive daily with the quantity of milk in each bottle. (c) Weight charts (model of Professor Budin) on which are marked the curve of normal increase per week of a full time infant and the weekly weight of the patient.

The Assistance Publique manages seven consultations for infants in Paris, and two in the immediate suburbs, exclusive of those connected with Maternities. During 1903, these nine were attended by 1,347 infants, of whom 307 were exclusively breast-fed, and 1,040 received sterilised milk. 19,910 attendances were registered at the weekly consultations, and the quantity of sterilised milk distributed reached 147,230 litres. The milk is sterilised in each dispensary by the female caretaker, assisted by one helper ; it is only delivered to infants according to the doctor's prescription. The commercial cost of 147,230 litres was 38,080 francs 73 centimes ; the cost of the non-sterilised milk being about 25 centimes per litre ; after sterilisation, the cost worked out to an average of 49 centimes per litre for all the consultations. The distribution of larger quantities of sterilised milk, without any increase in the expenses of administration, will markedly decrease the cost per litre of the sterilised milk in future years.

The above, reduced to its simplest indispensable elements, is the organisation of a consultation for infants, which must not be considered as a sort of milk-depôt, with the sole object of distributing sterilised milk, but, first and foremost, a dispensary to which mothers shall bring their infants and be given necessary advice as to their feeding. Only such organisations as have at their head a doctor, to follow the infants in their regular development, and help the mothers with his advice, can be considered as of real utility.

III. *Results*.—What are the results which have been obtained in all these institutions ? A glance at the reports of the Directors shows that the mortality from diarrhoea has

almost entirely disappeared among their patients, even during periods of excessive summer temperature.

The mortality in France of infants under 1 year is heavy. From 1896 to 1900, 135,000 infants aged 0 to 1 year died each year. Thus, of 1,000 infants born, 160 to 170 die during the first 12 months. Of 1,000 infantile deaths, 385 are due to gastro-enteritis, diarrhoea. This mortality is essentially preventable. Infants die from gastro-enteritis most especially when they are fed artificially, and during the hot summer months. In Paris, during the summer of 1898, which was particularly hot, the number of infant deaths reached 240 and 280 per week.

At Professor Budin's Friday consultations for infants at the Clinique Tarnier, from March 1898, to December 1903, 712 infants attended during one month at least and 24 months at most; among these infants there were 26 deaths, giving a proportion of 36.55 per 1,000. As the average duration of attendance was nine and half months, the corrected mortality would be 46 per 1,000. During the same period, the mortality in Paris was 178 per 1,000. From March 1898, to December 1903, among Professor Budin's out-patients not one was lost from diarrhoea; in Paris, affections of the digestive tube gave a mortality of 69 per 1,000.

The Friday consultation was so largely attended that in March 1903, a second had to be organised on Wednesdays. The following are the results obtained during 1904 in these two consultations:—At the Friday consultation, among 143 infants, three died; one from gastro-enteritis, one from diphtheria, and the third from the sun. The single death from gastro-enteritis is as valuable as a laboratory experiment. At Easter last year, one of the mothers, whose infant was 17 months old, went away to Havre with her husband, leaving the baby to the care of its grandmother, who doubtless found it absurd to only give milk to such a fine child, and fed it with heavy soups and vegetables. When the parents returned, they found their child dying; they brought it to the Maternity, where it died a few hours later. At the Wednesday consultation, among 126 infants, no death occurred.

If the mortality falls in the infant consultations, this should be apparent in the statistics of towns which possess

them. It is so in Paris, where the infantile mortality is continually falling. In 1898 it was 147·8 per 1,000; in 1899, 81 per 1,000; in 1900, 104 per 1,000; in 1901, 80 per 1,000. In 1901, the mortality from diarrhœa was only 2·08 per 1,000. The number of infants attending the Consultations of the Assistance Publique has increased progressively: there were only 174 in 1898, 539 in 1899, 721 in 1900, and 1,438 in 1901.

Dr. Bresset has recently compared the infant mortality in Paris during the summer months of 1898, 1900, and 1904, which were particularly hot years. The maximum temperature was higher, and the hot period of longer duration in 1904 than in either 1898 or 1900, and yet the infantile mortality was markedly lower, never reaching 200 deaths per week, whereas in 1900 the total reached 260, and in 1898 270 and 280 deaths per week. Yet, in the capital, there are not more than 4,000 infants, who are looked after in the various consultations and dispensaries, public or private.

The diminished mortality among infants, who attend the consultations, is always considerable; but one may always be tempted to question the statistics given by the directors. If, however, the diminution is such that the infantile mortality in the whole town is lowered, then the result must be considered as undeniable.

In the town of Saint-Pol-sur-Mer, the infant mortality used to be so high that for 1,000 deaths at all ages there were over 500 deaths of infants under 1 year. During the five years before the foundation of the "Goutte de Lait," in October, 1902, the mortality of infants under 1 year was 218 per 1,000 births. In October, 1903, the infant mortality for the whole town had fallen to 209, and in October, 1904, in spite of the exceptionally hot summer, it was but 151 per 1,000 births, a diminution by almost one half.

The Mayor of Arques (Pas-de-Calais), Dr. Alexandre, organised a consultation for infants at the beginning of 1903. The infantile mortality in Arques from 1898 to 1903 had been 190 per 1,000 births, but it fell for all the town, in 1903 and 1904, to 101 and 112 per 1,000 births; the infants, who came to the consultation, only succumbed at the rate of 9 and 44 per 1,000. A further proof, that this result is

really due to the consultation for infants, is furnished by three neighbouring districts, which do not possess a consultation for infants, in which, in 1904, the infant mortality under 1 year was respectively—at Blendecques 136, at Wizernes 190, and at Longuenesse 200 per 1,000 births. In the department of the Pas-de-Calais, thanks to the activity of the prefect, there now exist 123 consultations for infants.

In the department of the Yonne, consultations have been founded in 106 communes, and there have been but 37 deaths among the 1,614 infants who attended. At Auxerre, the chief town in the department, a consultation was opened in 1904, and two deaths occurred among the 143 infant out-patients. Comparing the two hot years, 1898 and 1904, we find that, in 1898, 43 died among 210 infants under 1 year reared at Auxerre, giving a rate of 205 per 1,000, whereas in 1904, out of 274 infants, 33 died, giving a rate of 120 per 1,000. Thus the deaths among the infants following the consultation being practically nil, the total infantile death rate fell from 205 to 120 per 1,000.

At Varengeville (Seine-Inférieure) the mortality, during the seven years preceding the opening of the consultation, was 145 per 1,000. Whereas in 1898, the mortality reached 285 per 1,000, during 1904 none of the infant out-patients died, and the total mortality fell to 76.9 per 1,000.

These happy results are due to the medical supervision, and especially to the diffusion of breast feeding. At the consultation of Professor Budin, at the Clinique Tarnier, 95 per cent. of the infant out-patients are fed at the breast entirely, or take at the breast all they are capable of giving, for when this quantity is insufficient, then mixed feeding is resorted to. Dr. Maygrier, who carries on the first consultation founded by Professor Budin at the Charité, has 73 per cent. of the infants entirely breast-fed, 22.5 per 100 on mixed feeding, and only 4.5 per 100 artificially fed.

The consultations at dispensaries and "Gouttes de Lait" work on very similar lines to the infant out-patient departments connected with maternities, but the rôle of the doctor is much more difficult. As a rule, mothers come to them late, with babies 2 or 3 months old and more, already weaned, often ill, and sometimes dying. They come attracted by the

prospect of getting milk for nothing or very cheaply. The nurslings are frequently in a very bad condition, suffering from athrepsia or gastro-enteritis. The number of infants fed at the breast is not large, the majority of the mothers having no milk in their breasts, artificial feeding has to be continued, "*faute de mieux*," as Dr. Dufour so well expresses it. But breast feeding is the ideal to be reached, and in spite of the bad conditions, in which they are placed, the dispensaries must at all costs avoid the reproach of favouring artificial feeding. From the observations of Professor Charles at Liège, it is found that, in spite of every precaution, mixed feeding shows 10 times and artificial feeding 25 times more deaths than feeding at the breast.

The only conclusion is that breast feeding must be encouraged by all possible means. At Nancy, Professor Hergnott in 1890, founded a charity which allows him to give a gratuity to mothers delivered in the maternity, who return at the expiration of one month with their infant. The child is weighed, and the sum, given to the mother, varies according to the increase in the weight of the infant, the way the child is looked after, and the number of children in the family. As a result, not only do more women come to the maternity for their confinement, but the number of those who give the breast has considerably increased.

Dr. Panel, who directs a Municipal Dispensary at Rouen, has got the Municipality to give 3 lbs. of meat per week to mothers who feed their infants at the breast. Extra gratuities of 10 or 20 francs are given to those who look after their infants well. Giving this amount of meat per week to the mothers costs less than supplying the infants with sterilised milk. He has obtained the desired result in Rouen; before 1900 nearly all the women fed their infants with the bottle, while, since that date, the number of those who give the breast greatly exceeds those who give the bottle. Dr. Panel found among the 149 bottle-fed infants the mortality was 16 per 100, while among the 214 who were breast fed the mortality was only 4.2 per 100, which represents deaths from other causes, for the diarrhoea mortality among breast-fed infants has almost completely disappeared.

At Saumur Dr. Levrand has two Consultations. At one, he

makes women pay for the sterilised milk which their infants require ; at the other he gives a gratuity of 3 francs at each fortnightly weighing to the mothers, who feed their infants at the breast.

In Paris, at the Clinique Tarnier and at the Charité Hospital, every three or four months clothes, &c. for the infants are distributed among the women who attend the Consultation regularly. Dr. Vilderman gives tonics and milk as a galactagogue to mothers who nurse their infants. Dr. Ancelet gives tickets for meat and vegetables.

Conclusions.—We have thus seen what the Consultations for infants are : they consist in the medical supervision of the hygiene and feeding of their infant out-patients, whether they are accompanied by a distribution of sterilised milk, by a “*Goutte de Lait*,” or not.

The medical man in charge especially advises, and obtains, feeding at the breast in increasing numbers, because, for the first month of its existence, the best “*Goutte de Lait*,” as says Professor Budin, is that which the infant finds in its mother’s breast.

We have seen the results which can be obtained from these Consultations ; they will be more or less favourable according to circumstances, according to their organisation, and to the doctor who directs them.

Thanks to these Consultations, more mothers feed their infants at the breast, the general infantile mortality is lowered, and infantile diarrhoea disappears ; stronger healthier children who resist every ailment better are seen, because their digestive tube has not been deteriorated.



INFANTILE MORTALITY.

A STATISTICAL STUDY FROM THE PUBLIC HEALTH STANDPOINT.

By ARTHUR NEWSHOLME, M.D., F.R.C.P.,

Medical Officer of Health of Brighton.

MUCH attention has been directed to this subject. Medical officers of health in their annual, and other reports, have discussed it in much detail from various view-points; and the recent speeches of the Bishop of Ripon have done excellent service in rousing the community to a sense of its importance, especially in relation to the serious decline of our national birth-rate. The present contribution is intended chiefly to state concisely the facts of the case, a few directions in which improvement may be achieved being afterwards briefly indicated. It is necessary, in considering the facts, to state not only our present national position, but to compare this with the experience of the past, with our experience in regard to the death-rate at other ages, and with the experience of other countries, so far as the available data exist. Most of the following facts are derived from the annual reports of the Registrar-General of Births, Deaths, and Marriages in England and Wales. The first fact that comes out from our national returns is that *the infantile mortality of the country as a whole is stationary*. Thus the number out of every 1,000 infants born who have succeeded in reaching their first birthday was

In 1851-60	-	-	-	-	-	154
„ 1861-70	-	-	-	-	-	154
„ 1871-80	-	-	-	-	-	149
„ 1881-90	-	-	-	-	-	142
„ 1891-1900	-	-	-	-	-	154
„ 1901-04	-	-	-	-	-	141

The variations are on the whole temporary, and were it necessary, could be shown to be caused chiefly, if not solely,

by the high or low proportion of hot dry summers in each group of years, and the correspondingly high or low death-rate from infantile diarrhoea.

The next fact is that *this stationary infantile mortality has been associated with a great decline in the general death-rate of the community.* Thus the general death-rate at all ages has declined 14 per cent. among males and 19 per cent. among females between the decennial period 1851 to 1860, and the quinquennial period 1896 to 1900, while the infantile mortality has remained stationary. The following table is of interest as showing the portions of life, which have enjoyed the greatest decline of death-rate in the two periods under comparison (1851 to 1860 and 1896 to 1900):—

Age.	Percentage Decline of Death-rate when 1896-1900 is contrasted with 1851-6.	
	Males.	Females.
Under 5 years - - - -	14·	16·
5— - - - -	52·	50·
10— - - - -	53·	53·
15— - - - -	46·	55·
20— - - - -	44·	52·
25— - - - -	32·	44·
35— - - - -	11·	25·
45— - - - -	(+ 2·)	6·
55— - - - -	(+ 10·)	(+ 1·)
65— - - - -	(+ 4·)	1·
75— - - - -	3·	6·
85 and upwards - - - -	8·	10·
At all Ages - - - -	14·	19·

Thus, with the exception of ages 45 to 75 among men, and 45 to 55 among women, there has been a great reduction in the death-rate from all causes in the aggregate. The greatest reduction of death-rate in both sexes has been at ages 5 to 25, at which ages the average reduction is not far from 50 per cent. At ages 35 to 45, it is still very considerable, and there

is evidence of considerable improvement so far as women over 65 and men over 75 years of age are concerned. At ages under 5, an improvement of 14 to 16 per cent. is shown. As the death-rate of infants has not improved, it follows that in children, between 1 and 5 years of age, the prospects of survival have improved even more than is indicated by the above percentage reductions. | The causes of increased death-rate in men from 45 to 75 years of age are not far to seek. They are doubtless connected with the increased preponderance of urban life and of indoor occupations, without corresponding sanitary precautions. It is satisfactory to find that when 1871 to 1880 is compared with 1896 to 1900, there has been a considerable decline of the death-rate at these, as well as at other ages, showing that improved conditions of life are being made to overcome, at these ages, the evils associated with increased aggregation of communities in towns. But in infancy it is otherwise. The infantile population has not shared in the general improvement at other ages.

Before considering the causes which have led to this failure to secure improvement of the infantile death-rate, it will be convenient to state the position of England in relation to that of other countries. This is now practicable, owing to the insertion in the annual report of the Registrar-General for 1903 of extremely valuable tables giving statistics of a large number of colonies and foreign countries. From these tables the following table on page 492 is compiled.

Leaving out of question for the moment other parts of the United Kingdom and the Colonies, the countries, whose infantile mortality can be compared with that of England, comprise, firstly, Chili, Russia, Austria, Hungary, Germany, Spain, and Italy, in all of which the proportion of infants, who survive to their first birthday, is much smaller than in England; secondly, Switzerland, France, Belgium, and the Netherlands, in which the drain on infantile life is about equal to that of England; and, thirdly, Denmark, and, still more, Norway and Sweden, in which the sacrifice of life is remarkably small as compared with that in England.

England compares unfavourably with Scotland, and still

more unfavourably with Ireland. It compares very unfavourably with all its Colonies, excepting Jamaica and Ceylon, and, to some extent, Western Australia. The causes of these

	Deaths of Infants under 1 Year to 1,000 Births.	
	Average of 10 Years, 1893-1902.	1903.
England and Wales - - -	152	132
Scotland - - - -	127	?
Ireland - - - -	104	96
New South Wales - - -	111	110
Victoria - - - -	109	106
Queensland - - - -	103	120
South Australia - - -	106	97
Western Australia - - -	146	141
Tasmania - - - -	93	?
New Zealand - - - -	82	81
Ceylon - - - -	170	164
Jamaica - - - -	171	187
Denmark - - - -	133	?
Norway - - - -	94	?
Sweden - - - -	99	?
Russia (European) - - -	272*	?
German Empire - - - -	?	195‡
Prussia - - - -	199	194
Austria - - - -	228†	?
Hungary - - - -	224	212
The Netherlands - - -	152	135
Belgium - - - -	157	155
France - - - -	158	?
Switzerland - - - -	145	133
Spain - - - -	190†	?
Italy - - - -	173	?
Chili - - - -	333	352

* Average for 10 years 1890-99.

† Average of years 1895-1900.

‡ Average of years 1900-02.

§ Average of years 1901-02.

international differences will be briefly considered later ; but meanwhile the tendency to assume that any one factor will

explain the differences is to be strongly deprecated. The causes may be, and probably are, in part climatic, in part sanitary, and in part social, using the latter word to denote differences in respect of poverty, industrial occupation of mothers, artificial feeding of infants, and so on.

Thus it is known that, in urban districts, the infantile death-rate is always higher than in rural districts, as shown in the following table by Dr. Tatham¹:—

Years.	Average Rate of Infantile Mortality per 1,000 Births in			
	Urban Counties.*		Rural Counties.*	
	Males.	Females.	Males.	Females.
1873-77 - - - - -	176	146	140	113
1898-1902 - - - - -	180	149	139	111

* The urban counties comprised in the above table are Glamorgan, Lancaster, London, Middlesex, Monmouth, Northumberland, Nottingham, Stafford, Warwick, East and West Ridings of York, with a population in 1902 of 17,818,667. The rural counties comprise Bucks, Cambridge, Cornwall, Hereford, Hunts, Lincoln, N. Wales, Norfolk, Oxford, Rutland, Salop, Somerset, S. Wales (less Glamorgan), Suffolk, Westmorland, Wilts, with a population in 1902 of 4,279,175.

There is a minute increase in urban infantile mortality, and a minute decrease of rural infantile mortality in the 25 years between 1873-77 and 1898-1902. In the same period, the infantile mortality for England and Wales as a whole has remained practically stationary. But, during the same period, the proportion of the total population subjected to conditions which in 1898-1902 caused the infantile mortality to exceed that of rural counties by 23 per cent. among male babies, and 25 per cent. among female babies, had steadily increased.

In 1861 the rural population of England and Wales formed 36·6 per cent.

„ 1871	„	„	„	„	33·6	„
„ 1881	„	„	„	„	32·1	„
„ 1891	„	„	„	„	28·0	„
„ 1901	„	„	„	„	23·0	„

of the total population.

¹ Report of Inter-Departmental Committee on Physical Deterioration, Vol. I., p. 132.

Thus, instead of two-fifths, less than a quarter of the infants born in England now enjoy the advantages inherent to rural as compared with urban life, of which immediate access to cow's milk, which has not become stale (when artificial feeding is required), must be regarded as among the most important, though, doubtless, the general conditions of rural life must be more favourable than those of urban life to infantile health and survival. In view of the fact that an increasing proportion of the total infantile population is being subjected to urban conditions of life, which have always been relatively unfavourable to the survival of infants, it is clear that, notwithstanding the stationary infantile death-rate shown in England and Wales as a whole, *some improvement has in reality been secured*, though this is concealed by the increased aggregation of the population in towns.

We cannot, however, afford to be contented with the present state of matters, for two among other reasons. First, it is not satisfactory that the infantile death-rate of England and Wales is higher than that of Ireland, and of most of the English Colonies. It is still less satisfactory that we have to look to Tasmania, and to Norway and Sweden for the lowest infantile death-rates. Doubtless, the chiefly rural character of the population of these countries goes far to explain the difference, though not entirely so, as their total infantile mortality is considerably lower than that of the rural counties of England and Wales (see preceding tables). Climatic conditions also play a part in these differences.

Secondly, the lowered birth-rate in this country makes the saving of infantile life a matter of Imperial importance.¹ Owing largely to the propagandism of those who advocate artificial means of preventing conception, and to the widespread adoption of measures, which appeal to selfish instincts and degrade family life, the birth-rate is steadily declining, and particularly among those who can afford larger families. Our present concern is with the effect of the birth-rate in tending to lower the national increase of the population.

¹ For an accurate statement of this decline in the different counties of England see a paper by Drs. Newsholme and Stevenson in the *Journal of Hygiene* for April and July, 1905.

—	Birth-rate.	Death-rate.	Rate of Natural Increase.
1851-60 - - - - -	34·1	22·2	11·9
1861-70 - - - - -	35·2	22·5	12·7
1871-80 - - - - -	35·4	21·4	14·0
1881-90 - - - - -	32·5	19·1	13·4
1891-1900 - - - - -	29·9	18·2	11·7
1901-04 - - - - -	28·3	16·2	12·1

The 17 per cent. decline in the birth-rate has been accompanied by a 27 per cent. decline in the death-rate. It is impossible that the decline of the death-rate can continue in the same ratio. If the birth-rate continues to decline, the average age of the population must increase, and with it the death-rate, until the two become approximately equal, as in France at the present time. With ample opportunities for colonisation, and in view of the fact that, both in America and Australasia, the birth-rate is declining as rapidly, or more rapidly, than in England, this decline, and along with it the stationary infantile mortality, deserve the most serious consideration by all true patriots.

Much light is thrown on the causes of infantile mortality, and on the extent to which these are avoidable, by a consideration of the local variations in infantile mortality in England and Wales. Among the counties, the lowest infantile mortalities in 1903 were:—84 in Montgomeryshire, Hertfordshire and Oxfordshire, 85 in Wiltshire, 87 in Radnorshire, 91 in Dorsetshire, 93 in Montgomeryshire and Buckinghamshire, 94 in Berkshire and Huntingdonshire, 95 in Sussex, 97 in Surrey, 98 in Westmorland, and 100 in Shropshire and Hampshire. At the other end of the scale are:—Durham, with an infantile death-rate of 156 per 1,000 births; Lancashire, 154; Northumberland, 152; Nottinghamshire, 151; West Riding, 150; East Riding, 149; Warwickshire, Glamorganshire, and North Riding, 144. In the 76 great English towns in 1904, the infantile death-rate varied from 87 in Hornsey, 100 in King's Norton, and 108 in Hastings, to 192 in Salford, 196 in Liverpool, 197 in Birmingham, 203 in Stockport, 212 in

Hanley, and 229 in Burnley. In the 142 smaller English towns in 1904, the lowest rates were 88 in Reigate, 91 in Moss Side, 93 in Eastbourne, and 95 in Taunton; the highest were 238 in Batley, 239 in Aberdare, and 266 in Farnworth. These local variations of infantile mortality offer ample scope for further investigation, and would, if carefully and differentially investigated in relation to causes of death, furnish ample indications as to directions in which ameliorative measures are most likely to be successful. This is pre-eminently a subject in which the skilled use of statistics can be of the greatest service to the public health.

In the solution of this important problem, Dr. Tatham's table of the relative incidence of the various causes of infantile deaths gives important indications. The table, of which the most important items for males are summarised below, deals with the same groups of urban and rural counties as have been already indicated.

—	Death Rate of Male Children under One Year of Age per 1,000 Male Births.			
	Urban Counties.		Rural Counties.	
	1873-77.	1898-1902.	1873-77.	1898-1902.
Meningitis, convulsions	32	23	26	20
Atrophy, &c. - -	30	24	33	24
Diarrhoea, dysentery, cholera, enteritis.	22	37	11	19
Bronchitis, laryngitis -	21	17	13	13
Premature birth -	14	22	13	21
Tuberculous diseases -	12	8	8	5
Pneumonia - - -	10	14	7	9
Whooping cough -	6	5	5	5
All other causes - -	29	30	24	23
	176	180	140	139

Comparing the groups of urban and rural counties respectively with themselves, at an interval of a quarter of century,

we find a great increase of diarrhoea in both groups, probably associated with, and due to, a great increase of artificial feeding of infants, though no exact data are ascertainable on this point when contrasting the two periods. Diseases of the respiratory organs have remained about stationary, tuberculosis has declined, so likewise have meningitis and convulsions; while deaths ascribed to premature birth have greatly increased. Whether this last item represents a real increase, and the decrease under the heading of atrophy, which is equally great, is a real decrease, is open to doubt. It must be remembered, that the causes of infantile deaths are frequently vaguely returned, and that accurate certification has become more common in recent years. Hence it is open to question whether the increased proportion of premature births is apparent or real. Some light might be thrown on this problem by a study of the available statistics in relation to the proportion of married women industrially employed in different districts.

A recent report by Dr. J. F. J. Sykes, the Medical Officer of Health of St. Pancras, also throws new light on this point. When 1876 is compared with 1901 the following differences in infantile mortality are displayed:—

—	—	Age in Months.			
		0-3.	3-6.	6-9.	9-12.
Percentage change in Infantile death-rate in 1901 as compared with 1876.	St. Pancras	Per Cent. + 12	Per Cent. + 3	Per Cent. - 4	Per Cent. - 22

The figures, from which I have calculated the preceding differences, indicate, as pointed out by Dr. Sykes, a great increase of death-rate in the first three months of life, a smaller increase in the next trimestre, and a marked decline in the second six months. The increase is shown by Dr. Sykes to have been chiefly in the first month of life, especially in the first week of life.

With these figures may be contrasted the following table, calculated from a table contained in the same report :—

—	—	Age in Months.		
		0-3.	3-6.	6-12
Percentage change in infantile mortality in 1898-1901, as compared with 1888-92.	England and Wales	Per Cent. + 7	Per Cent. + 6	Per Cent. + 6
	London - - -	+ 8	+ 10	+ 2

The preceding figures for St. Pancras lend support to Dr. Sykes' conclusion that "these changes indicate an increased immaturity of infants at birth." The figures for London do not point in the same direction, and those for England, as a whole, indicate that changes in the infantile death-rate have been distributed with a fair degree of uniformity over the first and the second half of the first year of life.

Dr. Tatham has collated the chief causes of infantile mortality in each county of England and Wales for the year 1902,¹ and although the subject cannot be further pursued here, the above reference will enable those, wishing to do so, to study it in further detail.

What are the chief causes which have produced the variations in the infantile mortality shown, when England is compared with other countries and the different counties of England among themselves? It is impossible, in the short space remaining to me, to do more than briefly summarise a few points. For further details, I must refer readers to other contributions of mine on the same subject.² A portion of the difference between various communities is *inevitable*, a portion *evitable*. I have no desire to exaggerate the former of these two elements, but it exists and should be recognised. Whatever precautions are taken, the risks to infantile life will always be greater in hot than in cool climates. This explains some of

¹ Brussels International Congress on Demography and Hygiene.

² *Elements of Vital Statistics*, chapter on Infantile Mortality; "A Contribution to the Study of Epidemic Diarrhoea," *Public Health*, December, 1899; "The Public Health Aspects of Summer Diarrhoea," *THE PRACTITIONER*, August, 1902.

the difference, for instance, between Jamaica and England ; also between different parts of England. The relatively wet summers of Scotland and Ireland, doubtless, lead to the prevention of much mortality from infantile diarrhoea which occurs in England. But it has been repeatedly shown that much of the death-rate from diarrhoea is preventable, even when external conditions favour its occurrence. Strict aseptic precautions in regard to food and feeding, with which every mother should be familiar, will go far to avoid danger.

It is unfortunate that we have no exact statistics as to the increase of artificial feeding of infants, though it appears to be generally assumed that such an increase has occurred. If this be so, it must follow that other conditions of infantile life must have improved, inasmuch as the artificial feeding of infants implies increased use of cow's milk by infants, the largest proportion of whom dwell in towns, and cannot, therefore, obtain it, as they could in the past, in a fresh condition. Diarrhoea is much more fatal among such hand-fed than among breast-fed children ; so, likewise, are rickets and other causes of infantile mortality. And yet the infantile mortality is stationary. It follows, therefore, on this assumption, that other conditions of infantile life, apart from food, have improved during the last 40 years.

I do not propose to discuss the effect of illegitimacy, which doubles or even trebles the chance of an infant dying before it reaches its first birthday. Nor is it necessary to analyse the discrepant results as to the relationship between high infantile mortality, and the industrial occupation of women. Apart from elaborate statistics, there can be no reasonable doubt that any cause, which deprives the infant for nearly half of each working day of the care of its mother, must, partly by leading to artificial feeding and partly by other sources of neglect, seriously diminish the infant's prospects of life.


What is the ideal of infantile mortality which we should endeavour to reach? I should personally fix it at 75 per 1,000 births, though it will be many years before this general standard is reached. In 1874, Mr. C. Ansell showed that, among a large number of families of the upper and professional classes, the infantile mortality was 89 per 1,000 for males and 70 for females. The ideal is, therefore, one which

is already achieved by those who can bring comfort and intelligence to bear on the problem. It surely cannot be inevitable that among the industrial classes, who form the majority of the population, the infantile death-rate should be double and often treble that of the more leisured classes.

The difference can be, and ought to be, bridged over. In striving towards this end, the provision of crèches and, more especially, the provision of sterilised milk for infants by municipalities cannot be regarded as more than temporary and palliative measures, which may even serve to retard the real reforms on which improvement must ultimately depend. The responsibility for the care of the infant lies with the mother, and the hope of improvement lies in influences brought to bear upon her. The substitution of non-parental for parental care is only a makeshift, necessary in exceptional instances, but always to be regarded as a last resort. Efforts at the training of elder girls in domestic economy and hygiene, the visitation of sympathetic and competent lady inspectors and nurses, soon after the birth of the infant and at intervals afterwards, the exercise of sympathy and interest in these directions are likely to do more good than the indiscriminating provision of sterilised milk or of crèches.

The question is not merely one of ignorance, but one relating to morals. Money, which is needed for the efficient feeding of the mother and her babe, is spent on alcoholic drinks. When we remember that, on an average, from six to seven shillings is spent every week in each working man's family on alcoholic drinks, and that this implies, in an enormous number of homes, carelessness and neglect of family responsibilities and duties, we cannot wonder that there is at present such a great and unnecessary loss of infantile life. Any scheme for diminishing this loss, which leaves out of the calculation the moral elements of the problem, can only be partially successful.

The preceding review therefore emphasises the fact that *a stationary infantile death-rate in the country, as a whole, may indicate the existence and operation of important factors tending to lower the infantile death-rate.*



INFANTILE DIARRHŒA.

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DIARRHŒA is a disease which is met with frequently both in breast-fed and in bottle-fed infants. In the former case, it is usually traceable to *the feeding*, and in the latter to *the food*. Slight attacks of diarrhœa in breast-fed infants can generally be corrected by diminishing the frequency of the feeding times, or the amount given at a meal. Sometimes, although rarely, the maternal milk does not suit the infant, and chronic diarrhœa results, in which case some other food supply must be obtained, milk from either a wet-nurse or a cow. In bottle-fed babies, diarrhœa is very common, arising from the use of impure or stale cow's milk, from the too early and excessive use of starchy foods, or from the employment of other solid and unsuitable diet. The adoption of a dietary, suited to the age and requirements of the infant, will usually soon restore a healthy condition of the bowels.

One of the gravest and most fatal diseases of infancy is that known as acute summer diarrhœa. As the name implies, the disease is largely one of the summer months, June, July, August, and September. The higher the temperature, and the longer the summer heat lasts, the greater is the incidence of this disease, which, in large cities at least, seems sometimes to come almost as an epidemic. It is essentially a disease of bottle-fed babies, or of those who are receiving some food in addition to the breast milk. The origin of the disease is traceable to certain organisms in the food, chiefly in cow's milk, which multiply, and cause intense irritation in the stomach and intestine. These organisms also produce toxins, which are absorbed into the system, and produce secondary and important lesions in distant organs. No one organism has yet been definitely associated with the disease, and very likely more than one may produce the same effect. In the heat of summer, certain organisms multiply in milk with alarming

rapidity, and it is probably the number of the invaders, which break down the resisting powers of the stomach and intestine, rather than the virulence of the individual organism. It is also to be noted that an infant, whose alimentary canal has been weakened by improper feeding during the winter months, is much more likely to fall a victim to this disease in summer, than one whose powers of resistance have been maintained at a high level.

The disease runs a very acute course in many cases. The infant may be in a moribund condition at the end of twenty-four or forty-eight hours. In other cases, and more commonly, the disease will last for from four to seven days or longer. Not infrequently the acute diarrhoea passes into a chronic stage, as the result of injury to the gastro-intestinal walls during the acute stage. A previously healthy infant may be so altered by an attack of summer diarrhoea, that it is many months before the appearance of health is restored, and the intestinal functions are properly performed.

The pathological changes found in fatal cases are few. The whole intestinal mucosa may be swollen and inflamed, and the lymph follicles may be noted to be enlarged and oedematous. On microscopic examination, cloudy swelling and desquamation of the epithelium are present.

The onset of the disease is usually acute, although, in some cases, there may have been slight gastro-intestinal disturbance for a few days beforehand. The infant becomes peevish, refuses its food, and is sick. The temperature rises, and the motions become loose, each evacuation being accompanied by the pain of colic. The condition rapidly becomes worse within a few hours. Vomiting becomes persistent after each feed. The bowels are moved more and more frequently. The motions, at first loose, but with yellow matter in them, become more and more watery. Some greyish or greenish material may be present, but the chief constituent is mucus or blood-stained mucus. If milk, or other food, is still being given, it will pass rapidly through the alimentary canal unchanged. The stools may be extremely offensive, and may be so acrid that the buttocks become at first red, and later ulcerated, unless the diapers are constantly changed. There are marked changes in the appearance of the infant.

Increasing restlessness and thirst are present. Anything offered is drunk greedily only to be vomited again immediately. The child moans when disturbed, and calls out at intervals from the sharp pain of colic. The face becomes thin, pinched, and aged-looking. The eyes are sunk and staring, the skin is of a dirty, earthy colour, and the whole expression seems to bear the stamp of death upon it. The fontanelle becomes depressed, the pulse is feeble and rapid, and the extremities are blue and cold. The whole of the tissues of the body seem to be shrivelling up, and the abdomen is retracted with loose and inelastic skin. Convulsions may occur, but a state of coma usually supervenes, sometimes accompanied by hyperpyrexia, and sometimes by a fall of temperature to 95° or 93° F. These two conditions, coma with a very high or a very low temperature, are practically always signs of a fatal termination; but, unless they are present, the case is not hopeless, however acute the symptoms, and, however desperate the state of the infant, may appear to be.

While the primary lesion of the gastro-intestinal tract is responsible for the acute symptoms of the earlier stages, there may also be secondary lesions due to the absorption of the micro-organisms, or of the toxins produced by them. Of these, catarrhal pneumonia is one of the commonest and one of the most serious. It may develop during the acute stage of the illness, or not for some weeks afterwards, so that in the autumn, after the period of summer diarrhœa is over, cases of catarrhal pneumonia, directly traceable to it, are frequently met with. This complication is a very fatal one at whatever stage of the illness it occurs, and it would appear that it may be of an infectious character, like so many other forms of secondary catarrhal pneumonia. Another complication, which should be borne in mind, is acute otitis media. The ears should be carefully examined during and after an attack of summer diarrhœa, and if any bulging of the membrane is present, it should be freely incised. The ear lesion is usually suppurative. The kidneys have naturally a good deal of irritating matter to excrete, and albuminuria is often present. In some cases, acute nephritis, with great diminution in the amount of urine passed, or pyelitis may be produced. The acute septic condition of the early stages sometimes merges into chronic septicæmia,

with erythematous or pustular lesions of the skin, ulcers about the mouth, eyes, and nose, irregular pyrexia, and progressive cachexia.

As regards treatment, preventive measures rank first in importance, for it is very much easier to ward off the disease than to cure it. In the case of breast-fed infants, which have reached the time of weaning, it is better to defer that process until the end of the summer, as the disturbances, which accompany the adoption of bottle-feeding, are very apt to be accompanied by diarrhoea. In the case of bottle-fed babies, the milk must be most carefully protected from infection during the hot weather. Under our present system of dairy supervision, no confidence can be placed in the milk as delivered to the customer, and therefore it should always be boiled as soon as received, and then placed on ice. Without entering on a discussion of the vexed question as to whether boiled or unboiled milk is best for infants, it may be safely asserted that, in hot weather, all milk for infants should be boiled for two or three minutes, and then kept cool in a closed or covered vessel. The greatest cleanliness should also be observed in connection with the feeding bottles, and no "dummy" soothers should be allowed in the infant's mouth. Any irregularity of the bowels, whether of the nature of constipation or diarrhoea, should be at once carefully treated. The tendency to give the baby one strawberry or one gooseberry, so common with nurses in the fruit season, should be severely discouraged as being distinctly dangerous. The infant should be properly clothed so as not to be exposed to chills. The danger here lies not in too few but in too many clothes. If a child is at all delicate, it is customary to overload it with clothes in summer, so as to avoid the risk of catching cold, with the result that the skin is constantly damp from sweating, and chilling of the surface of the body can scarcely be avoided. Such a chill lowers the resisting power of the tissues generally, and of the alimentary canal more especially. The clothing should be light and loose, and a flannel binder ought always to be worn round the abdomen. Certain infants are more prone to diarrhoea than others, and this applies specially to those suffering from rickets. All such infants should, if possible, be sent out of town to the country or seaside during the whole

summer. It must also be remembered that this form of diarrhœa is infectious, so that it is not advisable to have other infants in the same room, and it is necessary to sterilise by boiling, or still better to burn, all diapers used by the patient.

In the treatment of the disease, many different remedies have been recommended, and tried, and found wanting. Acids, alkalies, astringents, and antiseptics have all been regarded by various enthusiasts as of the nature of specifics, but the results obtained have disappointed those who have given them a fair trial. The disease is so acute in its course, and presents so many and such diverse symptoms, that no one line of treatment can be laid down. Instead of discussing all the different forms of treatment, it may be better to describe the method which the writer has adopted as the result of experience. It may be described generally as evacuant and eliminative. The first object is to remove the poison from the seat of its active production, namely, the gastro-intestinal tract, and to eliminate from the blood and tissues the toxins and organisms which have found an entrance. At the same time, one must prevent the introduction into the body of further doses of the poison, or of food materials, which may prove a suitable medium for the growth of the organisms.

Milk in any form must be at once stopped as part of the diet. Milk is especially dangerous in this disease, because it usually conveys the poison, and is a good medium for the further growth of the organisms in the alimentary tract, and because during the acute stage the patient's stomach cannot digest it. We have, therefore, to find some temporary substitute, during the time that attention is being devoted to thoroughly clearing out the gastro-intestinal tract. In very acute cases, the best plan is to stop all food entirely, and to give only boiled water, or barley water, or rice water, for 24 or 48 hours. This usually meets with a strong protest in the domestic circle on the ground that the infant will be starved to death. The anxious mother may be assured that the infant is incapable, of digesting, or absorbing any food, and her attention may be directed to the motions, where the milk given has appeared quite unchanged. As the thirst is usually very great, the water should be administered frequently, every hour or two hours, but not in large quantity, as vomiting is

so easily induced. If the vomiting is very severe, it may be necessary to give only one or two teaspoonfuls of water at intervals of 15 or 20 minutes. A little brandy is probably beneficial, if given well diluted—a teaspoonful in half a pint of water during the day, and the same amount during the night. At the end of 24 or 48 hours, or when sufficient time has been allowed for the thorough evacuation of the bowels, a beginning should be made with food in the shape of albumen water, or weak veal, mutton, or chicken soup. Here the rule must be to proceed very slowly and gradually. Albumen water may be made at first of the strength of half an ounce of the white of egg to half a pint of water or barley water, and this may be rendered more palatable by the addition of 2 drachms of extract of malt. Similarly, an ounce of soup may be diluted with 5 ounces of water to begin with. As regards the feeding, the rule should be to feed every two hours during the day, and every four hours during the night, and only to give small quantities at first. If thirst is great, no harm is done by giving the infant water freely between the feeds. This modified diet may be carried on for one or two days, until the diarrhoea is diminished, and the motions are not of a purely mucus character. If the albumen water is found suitable, there is no occasion to give the soup; but in some cases the soup seems better tolerated. The third stage is reached when we commence tentatively a return to milk food. A trial of milk in one or other form should be made by alternating it with the albumen water. Of the various forms in which milk may be used, the following represents a scale of digestibility: (1) peptogenised milk (without added cream), (2) whey, (3) condensed milk, and (4) equal parts of cow's milk, lime water, and barley water. It is not necessary to take every infant through these four stages, but, in one patient, one form of milk will be found best, and, in another patient, some other form. Needless to say, if the milk provokes a recurrence of vomiting or diarrhoea, it must be at once stopped. The chief points about the dietetic treatment are:—(1) To give no food until the stomach can retain and digest it, (2) to begin with very weak foods and with small meals, and (3) to let the patient have as much water as he can retain, so as to help in washing out the bowel,

The medicinal part of the treatment, in the early stage, consists in the thorough cleansing of the intestinal tract as quickly as possible. The best drug is castor oil, which is more effective if administered in small repeated doses. The following formula will be found convenient :—

℞ Olei Ricini	-	-	-	-	℥ x.
Tincturæ Rhei	-	-	-	-	℥ v.
Glycerini	-	-	-	-	℥ v.
Tragacanthæ	-	-	-	-	gr. ½
Aquam Menthæ Piperitæ	-	-	-	-	ad 3 j.

Sig. 3 j. every four hours.

This may be given every four hours, for the first 36 hours, and then less frequently. It is usually well tolerated by infants, but if there is much gastric disturbance and vomiting, it may be necessary to wash out the stomach first. Instead of the castor oil, one may use small doses of mercury. Grey powder in one-quarter grain doses, or calomel in one-sixth grain doses, may be given every two hours, until six doses have been taken. When the acute symptoms are subsiding, and the motions are becoming less frequent, a sedative mixture may be given as follows :—

℞ Sodii Sulphocarbollis.					
Bismuthi Subnitrat	-	-	-	-	āā grs. ij.
Tragacanthæ	-	-	-	-	gr. ½
Glycerini	-	-	-	-	℥ x.
Aquam Distillatam	-	-	-	-	ad 3 j.

Sig. 3 j. every six hours.

During the course of the illness various symptoms may be present which call for special treatment.

1. *Vomiting*.—When vomiting is severe, the stomach should be washed out with a weak solution of Condry's fluid, or of bicarbonate of soda. Until this has been done, it is often impossible to adopt any effective treatment. The substitution of rectal feeding for stomach feeding is useless, as the bowel is not in a condition to absorb anything. The sedative effect of washing out the stomach will be increased, by the application of hot fomentations to the abdomen, for three or four hours.

2. *Pain*.—When severe colicky pain is present, four or five minims of paregoric may be given to secure relief. The use

of opium in this affection is not without danger, and it should not be given if the patient is in a collapsed, or a semi-conscious, condition. Opium should not be given in solid form, as in Dover's powder, as it will not probably be absorbed. If opium is contra-indicated, the tincture of belladonna, in doses of two or three minims, may be used for the relief of pain.

3. *Offensive Stools.*—The motions are sometimes so offensive as to render the air of the room most unpleasant. The addition of one or two grains of salol to the castor-oil mixture, given above, will help materially in reducing the offensiveness of the motions.

4. *Restlessness.*—The restlessness of the acute stage will be greatly relieved by the use of hot baths, quickly and frequently administered. The value of hot baths in this affection cannot be over-estimated. In addition to calming the nervous system, and thereby inducing much-needed sleep, they are stimulating, and, by their action on the skin, help to eliminate the poison from the system.

5. *Collapse.*—The great loss of fluid produced by the diarrhoea often leads to a condition of collapse, of shrivelling up of the tissues, and of cardiac weakness. This condition is best treated by the subcutaneous injection of normal saline fluid. A Southey's, or other small, trocar may be used, and the warmer sterile fluid should be allowed to flow by gravitation into the loose tissues of the axilla or abdominal wall. About 8 or 10 ozs. should be injected at one spot, and the fluid should be allowed to enter slowly, so as to avoid the risks of sloughing or hæmorrhage. The tissues will absorb the fluid rapidly, and, when a part has been thus absorbed, the restorative effect on the patient is often marvellous. The benefit thus obtained may be increased by small doses of brandy, nux vomica, or strychnine. These injections of saline fluid serve a further beneficial purpose, in aiding the elimination of the toxins from the blood and tissues, and should be repeated as often as necessary to keep up the fluidity of the blood and tissues. Strychnine is of undoubted value in collapse from cardiac weakness, and is best administered hypodermically in doses of one-half minim of the liquor strychninæ. The reaction of infants to strychnine, in the toxic condition present, is very much less than in healthy subjects,

and full doses may be safely given. The value of brandy, as a stimulant, is undoubted if given in small doses ; but it is very questionable, if large doses are beneficial in this affection. It must be remembered that brandy, as a drug, is more valuable in cold than in hot weather, and that, in the latter case, much smaller doses are required. For an infant of 6 months suffering from summer diarrhœa, half an ounce of brandy in 24 hours is a maximum amount, and if one is not certain of its beneficial effect, it is much better to discard it altogether.

During the acute stage, it is advisable to preserve a cool and fresh atmosphere around the patient. To secure this end, the infant should, if possible, be in the open air all day, and also all night if the weather is suitable. The presence of pyrexia is no contra-indication to this treatment, for the surface of the body can be protected as well out-of-doors as indoors. What the infant needs, and should have, is a constant supply of pure fresh air for the lungs. When convalescence has set in, the utmost care must still be taken, as regards the food and feeding, for relapses are very common, and are naturally more serious, even than the initial attack, owing to the debilitated condition of the patient. The best restorative, and the best protection against relapses, is a change of air to the country or seaside.



ON CONVULSIONS IN EARLY INFANCY.

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INFANTILE convulsions are, perhaps, the most typical of all the nervous derangements of early childhood. The mere fact, that they so often indicate a purely functional derangement of the nervous system, is characteristic; for it is a truism that in sick babies, functional are commoner than organic diseases, and symptoms bulk more largely than physical signs. That convulsions are characterised mainly by spasmodic movements, makes them further representative of the diseases of early life. The main function of the young infant's brain is the regulation of his movements; its derangements, therefore, are apt to take the form of motor rather than sensory neuroses.

CAUSATION OF CONVULSIONS.

Like all nervous disorders, which consist in disturbance of function, convulsions have often a multiple causation. That is to say, in order to explain their onset, we must often take into account, not only a combination of several exciting causes, but also a number of predisposing conditions. This point is of some practical importance, because we may sometimes succeed in stopping the recurrence of the convulsions, by curing one or more of the causes, even although the others are quite beyond our treatment. The division into predisposing and exciting causes is convenient, although it must be admitted that it is not always easy to draw the line clearly between the two classes.

Of *predisposing causes* four may be mentioned:—(1) There is, of course, the *age* of the patient—the state of development of the infant's nervous system, predisposing him to all kinds of convulsive attacks. (2) Certain general diseases may predispose—especially *rickets*. This is by far the most important of the predisposing causes, as it is the only one which is amenable to immediate treatment. The tendency to convulsions, in rickety children, rapidly disappears under antirachitic

treatment, even although obvious sources of peripheral irritation persist. (3) A very important predisposing element is an *inherited nervousness* of constitution. Some children are hereditarily so nervous, that any rise of temperature or any peripheral irritation, however slight, may bring on a fit. This state of nervousness may be found in children who seem otherwise strong; and sometimes many members of a family have it to a marked extent. (4) Another predisposing condition is a permanently *damaged state of the brain* from any cause—quite apart from any recent changes in it. An area of cortical sclerosis, for example, even when it does not, apparently, affect the mental functions, is very often accompanied by a tendency to convulsions. In the same way, nearly all the developmental, and other lesions, which produce imbecility, predispose also to convulsions on slight provocation. The recurrence of convulsions in very young children should, therefore, always lead to a careful investigation of the child's mental state.

Possible *exciting causes* are very numerous indeed. The most important of them may be classed in one or other of three groups. (1) They may result from a number of *intra-cranial* causes (diseases, injuries or circulatory changes). Such, for example, are concussion, hæmorrhage, tumour, abscess, and meningitis of all kinds; also the cerebral congestion, which we sometimes get in whooping-cough, and in some cases of congenital heart disease, and the cerebral anæmia, which accompanies severe diarrhœa and loss of blood. (2) *General acute morbid conditions*, again, are often responsible for a convulsive attack. A sudden rise of temperature, such as would produce a rigor in an adult, will often in an infant cause a convulsion. This is seen in pneumonia, and in various of the exanthemata, especially in scarlet fever. In uræmia, fits are not uncommon, and a large number of poisons, both metallic and vegetable, often occasion them. (3) *Peripheral nervous irritation* is certainly a common exciting cause of fits, and one which is often present even when its site of origin is obscure. Undigested matters in the bowel or stomach, painful lesions in connection with dentition, otitis or phimosis may readily start a convulsion in *rickety* or neurotic infants. Generally, as mentioned above, the place of rigors is taken in young children

by convulsions. It is, however, a very curious thing that acute irritation of the renal pelves frequently gives rise to rigors, even in very young babies. Among twelve cases of acute pyelitis from bacillus coli in infants, that I have seen, no fewer than six suffered from rigors. Two of the cases were in children of five and seven months respectively. In none of them had there been any ordinary convulsions.

SYMPTOMS AND DIAGNOSIS.

It is hardly necessary here to give a detailed account of a well-marked infantile convulsion, as its phenomena are just those of an ordinary epileptic seizure. It may be well, however, to say that there is the greatest difference in the severity of the attacks in different cases. In the worst, the tonic and clonic movements may be very severe, and the succeeding loss of consciousness profound and long-continued. In other cases, there may be just the slightest momentary unconsciousness, and no visible jerking at all. Slight and severe attacks often occur in the same child at different times.

There cannot usually be much difficulty in recognising a convulsion, if you see it. When, however, you have only the mother's description to go by, it may be impossible to be quite sure as to the nature of the "fit." Attacks of petit mal often pass unrecognised for months from the idea that they are merely slight faints. On the other hand, spasms of colic and laryngismus are not infrequently spoken of as fits. On two occasions, at least, I have seen cases of masturbation in female infants, who were being nursed tenderly, and were having bromides administered, under the impression that they were suffering from a variety of infantile convulsions.

EFFECT OF THE CONVULSIONS.

When mental defect is present after a series of convulsions, as is not seldom the case, it is generally probable that it existed before, and that it should be looked upon rather as a predisposing cause than as a result of the fits. Certainly, however, in some cases the intense cerebral congestion and excitement, accompanying the seizure, seriously injure the brain-tissue, either by causing hæmorrhage or otherwise. The recurrence of convulsions is accordingly often followed by

steadily increasing dementia, even in cases in which no naked-eye change is afterwards discoverable. Occasionally, although rarely, the attack may be fatal. This, however, probably occurs most frequently in cases in which the fits are complicated by laryngismus. These considerations emphasise the importance of using active measures to stop the attacks as soon as possible. In many cases, also, temporary damage is done, and one or other cerebral function may remain in abeyance for some weeks, or months, after a severe convulsive attack. Thus, passing hemiplegia, or aphasia, or amaurosis may occur, due to temporary, exhaustion produced in certain areas by the nerve-storm. Similarly, a condition of extreme intellectual dulness occasionally results, which is entirely and permanently recovered from, after it has lasted for many weeks.

DIAGNOSIS OF THE CAUSE.

Whenever the urgency of the symptoms has abated, the first thing, that demands our attention, is the discovery of the cause of the attack. In endeavouring to settle this question, we have to take various matters into our consideration.

(1) There is to begin with, the patient's *age*. Should the attack come on within the first fortnight of life, the chance of its being due to a birth-injury is to be remembered. It is, however, certain that convulsions from dyspepsia and from other causes, quite apart from trauma, often begin very soon after birth. To this subject we shall return later. Those convulsions, which begin after the second week, are not likely to have anything to do with a birth-injury. They may arise from a defective brain, from dyspepsia and from various other causes. The great majority of fits, seen in normally developed babies between six months and two years, belong to the rickety class.

(2) The *character of the fit* often gives us but little help in the diagnosis ; though, occasionally, it does shed some light on the question. If the features of the attack, *e.g.*, are those of petit mal, this generally, although not always, indicates a serious cerebral defect. If the fit is Jacksonian in character, this suggests a cortical lesion. If it is followed by prolonged unconsciousness, an organic cerebral cause becomes probable, although not certain. The fact of the movements being

unilateral or asymmetrical, does not necessarily, in young children, indicate a unilateral organic cause.

(3) The presence of *symptoms of any bodily disease*, that is known sometimes to cause fits, is, of course, of great importance. Thus, fever with rapid respiration, or a sore throat, may point to pneumonia or scarlet fever. A bulging fontanelle, head-retraction or paralysis, with a history of previous vomiting and headache, would suggest meningitis. While abdominal distension, malnutrition, &c., along with other dyspeptic symptoms, would naturally point to there being some connection with the alimentary canal.

TREATMENT OF THE ATTACK.

If the convulsion lasts long enough to allow time for treatment, it is generally advisable to begin by putting the child into a mustard pack or hot bath. It will be good for him, probably, and it will certainly soothe and relieve his alarmed relatives, who need something to do to take up their attention. To prepare the mustard pack, a towel is dipped into a quart of tepid water, with which a tablespoonful of mustard has been thoroughly mixed. It is then swathed round the infant's body, covered with the blankets, and left in position for from ten to fifteen minutes.

If the convulsive movements continue for more than a few minutes, or if they go on recurring at short intervals, more active measures are called for, and some form of sedative should be given. Chloroform is one of the best to use, and its administration is quite safe and often successful. Chloral hydrate is also very effectual, and its influence lasts longer than that of chloroform. If the child cannot swallow, it may be given hypodermically (grs. 2-3) or introduced into the bowel through a rubber catheter. For rectal injection, 5 grs. may be given to a baby of six months, and 10 grs. to one of a year old. In severe cases, perhaps the most effectual treatment of all is the hypodermic injection of morphine. Of this, gr. $\frac{1}{4}$ may be given to a well-grown baby of a year, and the dose may be repeated in half an hour, if no effect is produced. Morphine should not, however, be given to weakly or undergrown babies.

The chief question with regard to treatment in most cases

of convulsions, however, is not so much how to deal with the attack, as how to prevent its recurrence. The answer depends largely on the type of case with which we have to do. We shall, I think, best deal with this, and also with other questions regarding prognosis, if we consider briefly a few of the commoner types of infantile convulsions.

COMMON TYPES OF CASES.

(1) *From Birth Injury*.—If convulsions set in in a new-born baby, within the first week or so of life, it is only natural to suspect that they may be the result of some birth injury. This suspicion is greatly strengthened, if the labour has been a difficult one (protracted, breech-presentation, or forceps), and if there was difficulty in getting the child to breathe after birth. If the fontanelle is tense and bulging, this is a very strong point in favour of a diagnosis of intracranial injury.

The treatment of such cases should be purely expectant. The infant is to be kept quiet and warm, and everything possible done to favour his nutrition. Sedatives are not usually called for.

The prognosis must always be very guarded. It is probable that many of the children, who have traumatic cerebral hæmorrhages at birth, recover completely. It is, however, certain that a considerable number of those, who seem to get quite well, show symptoms of paralysis, or mental defect, in later childhood.

(2) *From Dyspepsia*.—In many infants who have convulsions, the attacks are clearly due to dyspepsia. Whether they arise reflexly from local irritation in the bowel, or are caused by some sort of auto-intoxication, need not be discussed here. In these cases, the fits may begin very soon after birth, or indeed at any time during infancy.

The main treatment consists in attention to the digestion, and especially in thorough regulation of the diet. The administration of modified and peptonised milk is often successful along with the judicious use of calomel, antacids, and stomach washing. Far the best treatment, however, consists in the employment, when possible, of a wet-nurse. Generally, no sedatives are required; but sometimes a few doses of chloral may be useful at first.

The prognosis depends on the progress of the dyspepsia. There is no likelihood that the brain will be seriously or permanently damaged.

(3) "*Idiopathic Convulsions.*" The next group of cases may conveniently be called "idiopathic convulsions," because no organic or peripheral cause can be discovered to account for them. It may well be that these cases are really, after all, due to reflex irritation, or auto-intoxication, which remain unrecognised. The practical point to remember, however, is that such causes are not discoverable, and, therefore, cannot be treated, and that a purely symptomatic treatment of the convulsive tendency is often entirely successful.

The fits in these cases may begin as early as the first week, and generally appear within the first few months of life. The convulsions are not generally very severe or prolonged, and there may be only two or three of them in the day at first. They usually, however, increase in numbers, and there are often as many as 20, or even 40, in the day; and this may continue for weeks. It is, therefore, most important that the treatment should be prompt and thorough.

To temporise with moderate doses of bromide, or to try alterations of diet, when none are distinctly called for, is merely to lose time. What is necessary is to get the infant, as soon as possible, thoroughly under the influence of chloral; and, in these cases, this can be easily given by the mouth. In the youngest babies, gr. i. every two hours, and in children of one or two months, grs. i. to ii. is not too large a dose. The chloral should be continued, in these doses, until the fits have ceased for at least 24 or 36 hours, and then only gradually diminished in frequency. If the first dose given is not enough, the amount must be cautiously increased, until the baby is *almost* too drowsy to swallow. The greatest care must, however, be given to the feeding in these circumstances, as otherwise there is a considerable risk of an inhalation-pneumonia being set up. Usually we find that, after the chloral has been used for three or four days at most, the fits cease to return when it is stopped; and the child gets quite well. Occasionally there is a slight recurrence of the symptoms, but not often.

The prognosis is, therefore, generally favourable. It must,

however, be guarded, because the babies are so feeble that intercurrent disease is to be feared; and also because it is hard to be quite sure that no organic lesion is being overlooked. I have recently seen two cases, in which convulsions, apparently of this type, ushered in a very early acute general tuberculosis. There seems to be no tendency for fits of this kind, even if very numerous, to cause permanent damage to the intellect. Sometimes, however, the baby remains quite drowsy and stupid for weeks after they have ceased.

(4) *From Rickets*.—The commonest kinds of convulsions, met with in a city practice in this country, are those which occur in rickety children about the age of teething. In these, the predisposing cause is all important; for if the rickets is energetically treated, the morbid sensitiveness to peripheral irritation rapidly ceases, and there are no more fits, even although no sedative drugs are given.

The age for this variety of convulsions is between six months and two years; and they are commoner during the spring months, when cold winds are blowing, than at any other time of year. The rickets is generally in an early and progressive stage. The diagnosis is made, by noting the presence of rickets, and the absence of signs of fever, or cerebral defect, or disease. It is strongly confirmed, if facial irritability (Chvostek's symptom), laryngismus, or tetany is, or has recently been, present.

Prompt treatment of the rickets leads, almost invariably, to most satisfactory results. The digestion has, of course, to be seen to, and the diet regulated, on strictly antirachitic lines. Cod-liver oil, with or without phosphorus, should be given. It is of great importance to see that the child has plenty of fresh air. It is well also to institute a regular cold douche once or twice a day; this has a powerfully soothing effect. Under such a regime, the baby's health usually improves rapidly, and the convulsions cease almost at once. Should they be very numerous, however, or very severe, it may be well, during the first day or two, to give a few doses of antipyrin (grs. i.-ii., according to age and size).

(5) *From Cerebral Defect*.—In many cases the occurrence of convulsions in an infant is the first, and it may be, as yet, the only sign of idiocy. Generally, the seizures, in these

circumstances, take the form of *petit mal* to begin with. The baby is seen, from time to time, to give a sudden jerk forwards of his head and shoulders. After this, he may be unconscious for a minute or so, with heavy breathing, and he often cries bitterly. As he gets older his "turns" become more obviously epileptiform in character, and usually develop into ordinary convulsions.

The occurrence of such attacks is a very bad omen for the child's future. They tell of a serious defect of the brain, and their frequent recurrence is always followed by further mental deterioration. The character of the fits, and the usual signs of mental backwardness, soon render the diagnosis easy.

The results of treatment are apt to be most disappointing. Sedatives have only a slight and temporary effect. If they are pushed, they upset the digestion, and do more harm than good. Frequent changes to the country, and at times the administration of iron, or some other tonic, form generally the best treatment. In a few cases, the administration of thyroid does good for a time.



VACCINATION, ITS TREATMENT, AND CONDITIONS OF THE INFANT, WHICH PRECLUDE ITS BEING DONE.

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IN dealing with the prevention of infantile disease, one kind of preventive medicine is of great importance. The science of Bacteriology has made much progress of late years, and the part played by bacteria, in the causation of many infectious diseases, is well recognised. Although, up to the present, the particular organisms have not been isolated, it is almost certain that measles, scarlet fever, and small-pox are due to such influences. Our knowledge of toxins, and anti-toxins is yet in its infancy, but that the theory, on which they are based, rests on a substratum of truth, is now generally believed. Jenner's great discovery of more than a century ago is strongly confirmatory of it, strengthened as it has been by the universal experience of mankind since his time.

In the preservation of infantile life, two points have to be regarded :—

- (a) Care must be taken with regard to autogenous disease or disease arising from within.
- (b) Every precaution must also be used to guard against heterogeneous disease, or disease, introduced by extraneous agencies.

With regard to measles, scarlet fever, and other exanthems, with the exception of diphtheria, no reliable protective inoculation has, as yet, been discovered, but the case is happily different with regard to small-pox, a disease, in its uncontrolled state, more virulent and destructive than any of the others. In the almost unanimous opinion of the medical profession throughout the world, efficient vaccination, at an early period, affords a nearly absolute immunity against this disease, for at least the first ten or twelve years of life. It is therefore incumbent on the guardian of every child to see that it is vaccinated as soon as possible, and a legal obligation has been imposed by the

State, in most civilised countries, to enforce this operation, when the child has attained a certain age. In the United Kingdom, that age is six months, and if, after due notice from the vaccination officer, a certificate of successful vaccination, or of insusceptibility to that operation, is not forthcoming, or unless the operation is postponed on account of the child's health by the medical practitioner in charge, the guardian is liable to prosecution and fine.

The object of this article is to consider, how the normal and healthy course of ordinary vaccinia can be best promoted, to examine the various conditions, that warrant the postponement of vaccination, to trace the various disorders, that may arise from the action of the vaccinal toxin, and to point out a suitable treatment for such complications.

In considering the conditions that contra-indicate vaccination, and render postponement advisable, the presence of small-pox locally in a sporadic or epidemic character, is of the utmost importance. Where postponement might be desirable, and even imperative, in the absence of small-pox from the immediate neighbourhood, when it is epidemic, or has broken out in the house where the child resides, vaccination ought nearly always to be unhesitatingly performed. This is governed by the principle that "of two evils choose the less." For the danger, to which an unvaccinated child is exposed in the presence of small-pox, far exceeds that arising from the accidental consequences, or sequelæ, of vaccination.

Where small-pox is not present, and there is no immediate fear of the infection, the following are the best rules that can be laid down :—

(1) Endeavour should always be made to vaccinate, when the child's health is at its best, and any deviation from the normal standard is a reason for considering the advisability of postponement.

(2) Where the child has recently been exposed to the infection of a zymotic disease, such as measles, scarlet fever, or erysipelas; as, for instance, when one of these diseases has lately prevailed in the house, where the child resides, vaccination should be postponed till after the house has been disinfected, or at least till a reasonable time has elapsed from the convalescence of the last patient.

(3) Where a child suffers from any form of wasting disease, caution should be exercised, and it is better not to urge the operation unduly on the guardian or parent. That, in such circumstances, the operation necessarily does harm, is by no means certain, and the experience of many vaccinators would incline to the belief, that it is rare for it to cause any aggravation of the existing evil, while the vaccinal process pursues a normal and healthy course. Generally, however, the practitioner would do well to be cautious. The rapid and serious changes for the worse, that frequently occur in such cases, not to speak of sudden death from ill-defined causes, render it very unwise to risk the possibility of such a catastrophe being ascribed to the vaccination. Though the imputation might be void of truth, it is difficult to disprove, and the discredit, brought on the practitioner and the operation, could not fail to be great.

(4) Care should be taken that the condition of the child's skin is healthy. Any such skin affection, as eczema, impetigo, &c., renders a postponement desirable, as the vaccinal process may not unlikely aggravate the malady, at all events, temporarily. It not infrequently happens that the child's skin is not in a healthy state, although it could not be said to be affected by cutaneous disease. There may be traces of intertrigo behind the ears, a few scabs on the scalp, slight excoriations on the buttocks, an urticarial eruption, or isolated sores, about the body, often due to parasites. There may also be a slight skin-wound, such as from a burn, where repair is progressing favourably. All these cases should be regarded with caution. The writer has often seen vaccination run a normal course, without in any way increasing the cutaneous lesions. Indeed, sometimes it might appear that a beneficial effect was produced, for chronic sores have rapidly healed after the performance of the operation. But this cannot be relied on, and if any change for the worse occurs, it is sure to be put down to the vaccination. It is, therefore, better to try to cure the sores before operating, bearing in mind the primary rule, that a thoroughly healthy skin is before everything necessary to guarantee a normal and healthy course in the vaccinal process.

(5) Children are liable to many minor ailments during infancy, and it is desirable to consider briefly some of them.

It is convenient for our present purpose to divide them into three classes :—

(a) Bronchial ; (b) Gastro-Enteric ; (c) Neurotic.

(a) A slight catarrh does not necessitate a postponement of vaccination. If the child appears otherwise in good health, with no impairment of respiration, and the only ailment stated is a slight cough, the operation may be fearlessly performed. But it is better to ask a few questions about the cough. If the child is said to "croup," or if, from cross-examination of the mother, there is reason to suspect whooping-cough, or laryngismus, the operation should be postponed. Where there is evident coryza, delay is also advisable, if the child has not had measles. Where the respiratory embarrassment is prominent, the necessity of postponement is obvious.

(b) Great caution is always necessary where the child is suffering from diarrhœa. Even if there is a suspicion of it, it is better to wait till the looseness of the bowels has subsided. Whether the vaccinia directly aggravates this disorder is doubtful, but some experienced vaccinators are of that opinion. Care is specially necessary in hot weather, and at times when diarrhœa is prevalent among the infantile population. The rapidity, with which diarrhœa, at such times, may run a fatal course in young children, is well known to all practitioners.

(c) It is well to postpone vaccination, if any symptoms are present, suggestive of an impending eclampsia. For a child to be seized with a convulsion, shortly after vaccination, would be most unfortunate. Whether the attack was, or was not, aggravated by the operation, could not be accurately determined, but, that it was largely in consequence of it, would most certainly be the opinion of the public. It is not easy to differentiate the eclamptic state, and much must be left to the individual experience of the practitioner. The general aspect of the child is a good indication, and evidence of local spasm is important. Postponement may also be advisable, when signs of dental irritation are pronounced.

With regard to postponement in general, it must not be forgotten that it is an evil. No one can tell when an epidemic of small-pox is impending, or can be sure that it will not break out sporadically in the house, or neighbourhood, of some of the postponed cases.

It may then be too late to vaccinate, and the unprotected children will not unlikely become victims. Anything that can be done, to avoid the necessity of postponement, is therefore important.

One method is to offer vaccination as soon after the first month as possible. I have no hesitation in saying that the experience of most public vaccinators proves that no harm results from early vaccination, and that the earlier it is done, the less likelihood is there of physical conditions in the child prohibitive of the operation.

It should be borne in mind that, under the Vaccination Acts, public vaccinators may not call at the homes of children, till after they have attained the age of four months, unless invited by the child's guardian; so that there is plenty of time for the private practitioner to go, in the meanwhile, and point out to his patients the advantage of early vaccination. If this were habitually done, more children, I feel sure, would be vaccinated, and the need for postponement would not so frequently arise. It would further render it unnecessary for the public vaccinator to call so often on the patients of other practitioners, and would tend to remove a grievance, which is frequently a sore point to the latter.

Next, with regard to ailments of children, more or less, directly induced by vaccination, and their treatment.

In considering this subject, the adage that "Prevention is better than cure" must not be lost sight of. There can be no doubt that, if it is desired that vaccination shall go through a perfectly natural and healthy course, three things are necessary :—

- (1) The operation must be carefully performed with all aseptic precautions.
- (2) Those in charge of the child must have adequate instruction as to its subsequent treatment.
- (3) The doctor's directions must be faithfully carried out.

Where all these precautions are observed, it will be rare, indeed, that any harm will ensue, and in most cases, where the vaccination takes an abnormal course, the operator can trace it to neglect of one of these rules.

(1) When performing the operation, it is essential that the surface of the skin, where the lymph is to be inserted should be

first systematically cleansed, either with soap and water, or ether. Three, or four, abrasions should then be made with a lancet, or needles, rendered aseptic, by being passed through the flame of a spirit lamp. Care should be taken that the area of all the abrasions, taken together, amounts to about half a square inch. Fresh calf lymph should then be carefully rubbed in. The whole operation can be quickly done, and in a painless manner : in most cases without making the child cry, a point of some value, when the feelings of the mother, who is usually present, are considered. Aseptic dressings should be applied, and fixed by a pad, or bandage, and the mother should be instructed to keep the dressings in their place, so as to protect the vesicles from accidental injury. The operator should call to inspect about the eighth day following. He should remove the dressings, and if the vesicles are well formed, with a normal areola, little will remain to be done beyond re-dressing the arm, and instructing the mother to send the child for further inspection, if the places do not heal within the next fortnight. If the areola is excessive, and involves more of the skin than usual, *e.g.*, if all the areolæ coalesce, there is a slight degree of inflammation present. In most cases, it rapidly subsides, but it is a good practice to cover the inflamed area with boracic acid powder, before re-applying the dressings. It is advisable, too, to see the arm again, in a day or two, for fear there should be an extension of the inflammatory process. This condition is usually caused by some irritation of the vesicles by friction, and is the first stage of the superficial cellulitis of the arm, which is met with in a certain number of cases. A considerable area of the arm may then be involved, there will be delay in the healing of the vesicles, and a certain amount of suppuration. Some enlargement of the axillary glands will also be present, in all probability, but this not infrequently happens in the course of normal vaccination. The treatment, the writer has found most useful, is to cover the affected skin with boracic acid or boracic wool, and lightly bandage, keeping it quite dry. On no account should poultices be applied to the vesicles, though warm boracic fomentations may sometimes be useful. Mostly, a free application of boracic acid, or a mixture of iodoform and boracic, in equal parts, is all that is necessary.

Passing on from simple cases of this nature, we come to a more serious condition, which may be due to simple irritation, introduction of an external poison, or an idiosyncrasy of the patient. About the ninth or tenth day, the pustules become rapidly larger, attaining a size sometimes two or three times the normal, while the areola increases greatly, and the skin of the arm is affected often as low as the elbow or hand; there is also marked enlargement of the axillary glands. The next stage is for each pustule to develop into a foul-looking ulcer, through the sloughing of the skin involved, and in the worst cases, all the ulcers may coalesce into one large one. With this, there may be constitutional symptoms, not unattended with danger, especially if there is much extension of the cutaneous inflammation. In most cases, under suitable treatment, the inflammation of the skin rapidly subsides, except in the immediate vicinity of the ulcer, and the patient makes a gradual, but slow, convalescence. The best treatment is to cover the ulcer with boracic acid and iodoform, and to apply hot boracic fomentations, while the inflamed skin may be dusted with boracic acid, and covered with boracic wool, or treated with evaporating lead lotion. Internally, the bowels should be regulated by small doses of calomel, and a few drops of Tr. Ferri Per. in glycerine, may be given two or three times daily. If suppuration of the axillary glands follow—a sequela very rare—it must be treated on ordinary surgical principles.

Cases of this degree of severity are very uncommon, and, if the child is of good physique, it will probably struggle through quite safely. But it must not be forgotten that there is considerable doubt as to the efficiency of the vaccination. Unless the vaccination has run a perfectly normal course, the result may be practically nil as a protection against small-pox. An early re-vaccination is always advisable, but the suggestion will probably not be well received by the parents of the child.

Erysipelas.—This is the most dangerous complication of vaccination, and is fortunately very rare. It may occur at any stage, but, in the writer's experience, it usually makes its appearance after the child has passed out of the hands of the vaccinator. Several weeks after the inspection, when all seemed healthy, the child is brought to the vaccinator, who is

informed that the arm has never quite healed. On making an examination, he finds that two, or more, of the pustules have been followed by normal cicatrices, the remainder are running sores. He may be told that one of the scabs was rubbed off, or that it did not heal like the others. There is a zone of inflammation round the sore, or sores, which may be more or less extensive, and there may be redness and œdema of the forearm, or some other part of the body. Constitutional symptoms may be trivial or severe. Nearly all these cases occur amid dirty surroundings, and where there is reason to suspect neglect. They mostly recover, but the prognosis should be guarded. Convulsions may supervene, or the skin affection extend to many parts of the body. As often as it subsides in one part, it reappears in another. The strength of the child may gradually wane, and exhaustion lead to a fatal result. The treatment is to dust boracic acid over the erysipelatous skin, carefully covering it with dry boracic wool, or lint, to apply boracic fomentations to the sores, and, in other respects, to treat the child on general principles. These cases are properly accidents of vaccination. The same result would arise from the toxic inoculation of any sore, and the vaccinator can never be justly blamed, unless by carelessness, or the use of septic instruments, he directly introduces the virus, or where he takes no pains to cover up the arm, and so allows it to be exposed to infection, which he might, and ought to have taken precautions against.

There is one other serious complication, and that is what has been called "Multiple Vaccinia." It is very rare, and the writer has only come across one case. It consists of a general eruption of vesicles in parts of body, where no inoculation of lymph has taken place. These may recur for weeks and months, and some may ulcerate and form unhealthy sores. In the case referred to, the child became marasmic and died, and the certificate of the cause of death was "Multiple Vaccinia." A mild variety sometimes occurs, where half a dozen supernumerary vesicles spring up in the vicinity of the inoculated ones, and run through a similar course. These complications can only be treated on general principles.

A few other cutaneous affections may be noticed, which not infrequently follow vaccination. They are too trivial to require

treatment, as they invariably disappear after a few days, and are probably due to an idiosyncrasy of the child. This is proved by their appearance in only one child, when, perhaps, half a dozen have been vaccinated from the same source. These eruptions usually appear on the ninth or tenth day after vaccination. They may be papular, vesicular, or erythematous, and are chiefly seen on the extremities. The papular, which may be a simple lichen, like red gum, but somewhat paler in colour, or of a more compound character, not unlike nettle rash (lichen urticatus), is the most common. But there may be a vesicular variety, often confused with varicella. An erythematous form (roseola) is sometimes seen, looking very like measles, without the catarrhal symptoms.

It may often be noticed, when one of these eruptions is present, that the arm appears to have "taken" a little too much, that is, is a little inflamed. Whether it is a consequence, or cause, of the eruption, or a mere predisposition, is uncertain. All the varieties are very evanescent, and require no treatment beyond the administration of an aperient, if necessary, and careful attention to any abnormal condition of the vaccinated arm.

In conclusion, the responsibility of practitioners under the Vaccination Acts requires some attention. As vaccination is compulsory, parents can get their children vaccinated at the public cost. When the services of the Public Vaccinator are requisitioned, the duty of transmitting a certificate to the vaccination officer devolves on that official. On the other hand, if the services of a private practitioner are sought, there is no obligation on the latter to carry out this duty. But he is bound, under a penalty, to furnish the guardians of the child with the necessary certificate, for it is their duty to send it to the vaccination officer.

What constitutes a sufficient vaccination to satisfy the law has not been properly defined. No. 7 of "Instructions to Public Vaccinators" lays down that "In all cases of primary vaccination the Public Vaccinator must aim at producing four separate vesicles, or groups of vesicles, not less than half an inch from one another. The total area of vesication resulting from the vaccination should *not be less than half a square inch.*"

Private practitioners are not bound by this instruction, but they ought none the less to endeavour to carry it out, because it is based on the largest experience, and the best knowledge we have on the subject. To vaccinate in one place only—as is too often done—serves but to bring the whole practice into contempt. Experience has abundantly shown that no real protection is afforded by such a vaccination, and it is far better to refuse to operate than be guilty of an act that cannot be defended. If a fee is accepted, it is a fraud, for it is being paid for what is recognised to be valueless, and if not, it is assisting in an evasion of the law, which is particularly unbecoming in a member of a profession largely responsible for legislation on this subject.

Something might be said for a practitioner, who openly avows his disbelief in vaccination, and refuses to perform it; but it is difficult to think charitably of one, who is a believer in the practice, and yet willing to vaccinate in a manner utterly at variance with the teaching of all authorities on the subject.



INFANTILE SCURVY.

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INFANTILE scurvy is a disease of modern times, and is attributable to altered conditions arising from over-civilisation, and from the crowding into cities, which makes it difficult or impossible for all children to be fed in an ideal manner. There has been a steady diminution, during the last half century, in the number of children, who are fed in the natural mammalian fashion—at the mother's breast. Some mothers are unable, others unwilling, to suckle their children for a sufficient time, or even at all. Vicarious suckling by a wet-nurse is rarely practicable, and the services of the cow have to be commandeered to supply the human deficiency. Cow's milk, however, is, in cities, rarely taken by the infant immediately after it is drawn from the cow. It has to be brought long distances, consuming much time, and, during its transit and storage, it has been exposed to contamination, and hence precautions, such as scalding, pasteurisation, or sterilisation by prolonged boiling, are adopted to prevent or check decomposition. However necessary such steps may be in the circumstances, it must be borne in mind that they do slightly alter the characters of the milk, as is evident, for example, to the palate. Again, to render milk less bulky, and so more convenient for storage, and also to ensure its keeping, it is "condensed" by evaporating it to a syrup at a low temperature, and here, again, the palate can detect that a change has occurred. But often the modification is greater still. The milk is completely desiccated, and mixed with carbohydrates, and put on the market as one of the proprietary infants' foods. Yet, again, fresh milk is often peptonised, and some of the proprietary dry foods are predigested in the process of manufacture. The advantages and drawbacks of these various methods of dealing with milk are discussed in another article; this introduction is intended to emphasise the fact, that numbers of children, rich as well as poor, during a period when they should be having "living" milk, are getting milk

which has undergone considerable change since leaving the cow. As a result of this frequency of artificial feeding, scurvy has appeared among children, and although cases are by no means common, they are steadily on the increase.

It is less than 30 years ago, since the nature of the disease was recognised by Cheadle, although isolated cases had been published under such titles as "Periosteal Cachexia," "Hæmorrhagic Periosteitis," &c. Cheadle's paper on "Three Cases of Scurvy Supervening on Rickets in Young Children" appeared in the *Lancet*, November 1878. He published other cases, and again insisted on their identity with adult scurvy, in the same journal in July 1882. But his views were somewhat slow in gaining general acceptance, and the cases were regarded as exceptional forms of rickets: and they were described, especially in Germany, as "Acute Rickets." The true state of affairs was demonstrated in a masterly paper, read by Sir Thomas Barlow before the Royal Medical and Chirurgical Society, entitled: "On Cases described as Acute Rickets, which are probably a combination of Scurvy and Rickets, the Scurvy being an essential, and the Rickets a variable, element." In the paper, the clinical and post-mortem characters of the disease were so thoroughly and accurately worked out, that little has been added by subsequent observers. The truth of Cheadle's contention was thoroughly established, and Barlow's paper will always be a classic in clinical medicine. In France and Germany the condition is generally known as "Barlow's Disease." Owing to the frequency with which the disease is found in children suffering from rickets, the condition is still often described as "scurvy rickets." But, as Barlow showed, the scorbutic symptoms are quite independent of rickets, and rickets may be entirely absent. It is no more appropriate to speak of "bronchitis-rickets," and it is better to employ the term *Infantile Scurvy*.

Onset of Symptoms.—Although the full manifestations often appear suddenly, it can usually be elicited, from the parents, that the health of the child has been unsatisfactory for some time, and that such warning signs as anæmia, restlessness, and fretfulness when handled, have been present. Then, often suddenly, painful swellings appear in connection with the long bones, causing acute suffering: so suddenly, indeed, that suspicion of falls or injury are entertained, and the nursemaid

may be packed off in disgrace. For instance, in one case seen by the writer, the child was in splints for supposed traumatic fracture of the humerus, and in another the child had, for a fortnight, endured unnecessary suffering from splints for a supposed injury to the femur. In both instances, it was assumed that the baby must have been dropped, or roughly handled, by the nurse.

General Appearance.—The infant, usually between 10 and 18 months old, is well nourished but pale, and usually has a peculiar sallow "earthy" cachectic appearance. He may be lying quietly, without any appearance of suffering, but on the approach of anyone, he screams with apprehension, and, if handled in any way, gives peculiarly piercing shrieks of pain. When uncovered, he is found to be lying on his back, with the thighs everted, and the knees slightly bent. Instead of kicking and struggling, as a screaming baby usually does when it resents handling, it is at once apparent that the legs are not moved, and this immobility is often so complete as to lead to a diagnosis of infantile paralysis.

Hæmorrhagic Lesions in connection with Bones.—These are by far most frequent in the lower limbs. Swellings can be seen over the lower end of the femur on one or both sides or at one end of the shaft of either tibia or fibula. The skin over these swellings may be tense and glossy, but heat and redness are almost invariably absent. They are acutely tender and rather boggy on palpation. Occasionally, on gentle movement, soft crépitus can be elicited from fracture in the neighbourhood of the epiphyseal line. When this occurs at the lower end of the femur, the knee joint may be found filled with blood, but spontaneous hæmorrhage into joints is very rare in infantile scurvy, apart from fracture. Similar hæmorrhagic swellings also occur over the humerus, usually at the surgical neck, and even where there is no actual hæmorrhage, the bones of the upper limbs are very tender when handled. Periosteal hæmorrhage has been found, post mortem, on the blade of the scapula, but, in the only case I have seen, no swelling was detected during life. Another occasional site for hæmorrhage is over the costo-chondral junction. In one such case, numerous fractures had occurred at the sternal end of the ribs, so that the sternum and cartilages receded into the thorax, the appearance resembling that when the body has been sewn up after an autopsy.

One or two cases have been recorded in which there was hæmorrhage from the inner surface of the dura mater.

Hæmorrhagic Lesions in the Gums.—This is only seen fully developed after the teeth have been cut, and, as a rule, the more teeth there are, the more severe is the sponginess of the gums. The gums at first may be only slightly swollen around the base of the tooth, and are of a deep purple colour from the extravasated blood. The swelling rapidly increases, and may be so great as to hide the teeth from view. These swollen gums readily ulcerate and slough, giving rise to horrible fœtor. The swallowing of this septic material greatly aggravates the anæmia. When the teeth have not yet been erupted, the gums may present a perfectly healthy appearance, but often there is some ecchymosis over the oncoming incisors, and where the incisors have already been cut, similar ecchymosis may be seen over the site of the future premolars. This condition of spongy gums is rarely entirely absent if the teeth are through, and is of the greatest help in forming a diagnosis.

Cutaneous and Subcutaneous Hæmorrhage.—Petechiæ and bruises may be met with, but much more rarely than in adult scurvy. More frequently hæmorrhage occurs into the orbital tissues, giving rise to proptosis, and, after a day or two, to discoloration of the lower eyelid. In one slight case, which came under my observation, hæmorrhage into the nymphæ and bone tenderness were the only symptoms.

Changes in the Urine.—Hæmaturia is frequently met with. It is rarely severe, but increases the anæmia. The urine is difficult to obtain in bulk in infants, but in two cases there was an extraordinary number of catarrhal cells, making the urine turbid, the condition rapidly disappearing as the other scorbutic symptoms cleared up. Epistaxis and hæmorrhage from the bowel are not uncommon. Hæmoptysis has not been observed.

Other Symptoms.—Unless the condition of the mouth is very septic, there is usually not much pyrexia. The temperature may even be subnormal, and rarely reaches 101° F. In fatal cases, hyperpyrexia may occur a few hours before death, but this must be regarded as a symptom of dissolution rather than scurvy. Examination of the blood shows the changes of secondary anæmia. The number of blood cells is diminished, and there is marked deficiency of hæmoglobin. There is no

leucocyte change. As Ralfe long ago showed, the alkalinity of the plasma is much reduced.

Slight Cases.—In the early stage, as has been already mentioned, the symptoms are much slighter; and cases are also met with in artificially fed children, where there is little to be noticed except anæmia, bone tenderness, and some redness of the gums round the teeth. Whenever a child suffers from bone tenderness, especially if it is rickety, the possibility of scurvy should be borne in mind and the diet rectified accordingly.

MORBID ANATOMY OF THE BONE LESIONS.

On examining the affected limbs, it is usually found that there is some hæmorrhage into and between the muscles, though to a less extent than in adults. The main changes are found in connection with the periosteum and shaft of the bone. These are most conveniently demonstrated in a vertical section. (1) The periosteum is found to be raised from the bone by an effusion of blood which, at the time of the post-mortem examination, may be decolourised. The periosteal membrane itself is swollen and infiltrated with blood, but a section, examined under the microscope, shows little inflammatory reaction. The periosteum is usually only raised over one end of the shaft, but occasionally the whole shaft is found to be bare. New bone is hardly ever formed in the elevated periosteum, and, in the very few instances, in which this has been observed to occur, the amount was small, and the new bone showed scarcely any calcification. (2) The shaft, although denuded of periosteum over a considerable area, rarely undergoes necrosis. Its nutrition is impaired, and fractures are not infrequent, taking place a little distance from the epiphyseal line. (3) The medulla shows speckled hæmorrhages in the neighbourhood of the periosteal hæmorrhages, and sometimes the medullary cavity is filled with blood. Rarefaction of the cancellous tissue is often seen, but is due to associated rickets rather than to scurvy.

Diagnosis.—In a well-marked case, the combination of spongy gums, bone tenderness and local swellings make the diagnosis easy. In cases where the gums are unaffected, there is often considerable difficulty. The immobility may suggest either infantile paralysis, or epiphysitis due to congenital

syphilis. The latter, however, hardly ever occurs as late as six months, while scurvy is seldom ever seen before that age. The high degree of tenderness in scurvy and the local swellings usually enable it to be distinguished from infantile paralysis, in which muscular tenderness is seldom acute. From injury, the diagnosis is often very difficult, especially if there is a fracture. In the absence of sponginess of the gums, the chief differential point is, that in scurvy there is usually marked tenderness of the long bones. The difficulty is that, with a screaming, terrified child, it is very hard to be sure about the presence or absence of tenderness. Lastly, the site and tenderness of the swellings may strongly suggest acute necrosis. This condition, however, is usually accompanied with high pyrexia, while, in scurvy, the rise of temperature is slight, and there is no local heat on palpation.

The cases, which are most easily missed, are the slight cases, where there is only hæmaturia or epistaxis. Usually careful examination of the gums will reveal the true nature of the hæmorrhagic affection.

Course of the Disease.—If the diet is corrected, as advised in the section on treatment, the symptoms almost always subside with the most striking rapidity. In less than 24 hours, the acuteness of the pain and tenderness will pass off, and the swellings will have become less tense. In a few days more, the blood will have been absorbed, though some periosteal thickening can be detected for some weeks. If fractures have occurred, they usually unite with great rapidity, and with little formation of callus. If, however, the diet is not rectified, the anæmia and cachexia increase, and, in a severe case, the child may die from exhaustion or from some intercurrent disease, such as broncho-pneumonia. In the milder cases, spontaneous improvement does occasionally take place, probably through the parent "tempting" the child by a more varied diet, but it is usually very slow. As regards any ultimate effect, the children grow up quite strong and healthy, although associated rickets may require treatment for some time.

Etiology.—The lesions, occurring in infantile scurvy, present no essential difference from those in the adult form, and there is general agreement that we are dealing with the same disease. Scurvy formerly broke out, whenever fresh food was unobtainable, as, for instance, on long voyages, during sieges, during

winter in Arctic regions, among armies, when they were stationary, and all local supplies of fresh green food had been used up. It has also broken out in recent times in camps of coolies employed in outlying places: *e.g.*, building bridges in Central Africa, when the food provided has not included fresh vegetables and fruit. It has been shown by Nansen and others that, even when fresh vegetables are not available, scurvy can be prevented by taking abundance of fresh meat. It has also long been known that outbreaks of scurvy could be at once stamped out, and that the sufferers would promptly recover so soon as fresh vegetables, meat, or fruit could be supplied, as when a siege was raised, or when the onset of spring awakened vegetation. Sub-acid fruits, potatoes, green vegetables, and fresh meat have special value. Since absence of fresh food promotes, and its provision cures, scurvy, we speak of it as having "anti-scorbutic" properties. Patient chemical investigation has failed to detect any body present in the vegetables and fruit, which, by experience, are found to be most anti-scorbutic, nor has any substitute for fresh animal and vegetable food (or their juices) been found which will cure scurvy. The nature of the anti-scorbutic property is still a mystery, and we are not yet in a position to state positively whether it is some "vital" property outside of our present methods of investigation, or some definite chemical body. It is probable, however, that, in addition to this negative factor, there is also a positive one, *viz.*, some toxic effect of the food taken. For it must be remembered that, during outbreaks of scurvy, there has not only been privation so far as fresh food is concerned, but the food which was procurable during sieges, on shipboard, &c., was of poor quality and also unwholesome. During the recent Antarctic expedition, scurvy was successfully kept off for a long time. But the preservation of the tinned food was defective, and as soon as they had come to the end of what was sweet, and had to use some that was tainted, scurvy broke out. Indirect evidence that there is some toxic factor required, as well as the negative one, is supplied by the curious fact, pointed out by Osler, that, in cases of starvation due to privation, to disease, or to fasting for public exhibition, scurvy does not occur.

In infantile scurvy there are also the same two factors—
(a) absence of a sufficiency of fresh milk (often none at all),

(b) the use of food which has undergone considerable alteration. So far as I know, scurvy has never been observed in an infant that was entirely breast-fed, except during sieges when the mother was herself suffering from scurvy. Nor does it occur in children, fed entirely on fresh unboiled milk, although, as Cheadle points out, the anti-scorbutic power of milk is low, and large quantities are necessary to protect the child. But it does occur, and sometimes severely, when the diet consists of only a small amount of unaltered milk, together with some preserved "patent" food. Indeed, in infants, the second factor, toxic effects of alteration in the food, seems to play a larger part than in adults.

Patients with infantile scurvy have generally been fed on sterilised milk, peptonised milk, or some of the dried proprietary foods. Condensed milk, unless infants' food is given as well, has not caused it in any case I have seen. And I have only seen it once, and then in the mildest form, where the child was fed entirely on pasteurised milk. A short time ago, there was an epidemic of infantile scurvy among children in Berlin, supplied with pasteurised milk from an institution; but it was found to be confined to children, whose parents, as an additional precaution, boiled the pasteurised milk for some time after it was delivered to the house. Out of 25 severe cases seen in hospital and private practice, 19 were taking some kind of dried infants' food as their staple diet (seven having a certain amount of fresh milk as well). The remaining six were taking sterilised, or humanised milk, or milk sterilised by prolonged heating. In his "Lectures on the Practice of Medicine" (Smith, Elder and Co., 1900), Cheadle gives full details of the previous feeding of 60 cases of infantile scurvy observed by him. Of these, 46 were taking various patent foods (13 of them taking a certain amount of milk said to be fresh at the same time), and among the remainder, three were taking peptonised, and seven sterilised, or humanised milk. It is clear that, without artificial feeding, we should have no scurvy, but it is also true, that it is only a small proportion of artificially fed babies, that develop scorbutic symptoms. What the predisposing causes, in this minority, may be we have at present no knowledge. At one time it was suggested that syphilis was a predisposing factor, but this has been disproved. Nor does it appear that rickets

has any effect in determining the outbreak of scurvy, for all rachitic symptoms may be absent, and the frequent association of rickets and scurvy seems to be due to a common cause—unwise dieting. The fact remains, that, when a child is artificially fed, there is risk of scurvy, and this can be satisfactorily obviated by supplying the child with milk as little altered as possible after it is drawn from the mamma of the animal supplying it.

Treatment.—The treatment is simple. (1) Stop all food which is not absolutely fresh. (2) Give the child abundance of fresh food. The appetite is usually very good, and unless the mouth is very sore, the child will take such food freely. *Unboiled* milk, orange or lemon juice, suitably sweetened, fresh cream, raw meat juice, are the best to employ. Potato soup, made by sieving a potato cooked in its jacket and pouring over it a breakfast cup full of boiling milk, slightly sweetened, may also be given, if the child is over 10 months old. The limbs should be steadied either by sand-bags, or by loosely encasing them with sheet lead. Firm bandages and splints should be avoided. Weak peroxide of hydrogen lotion is a useful application for the stomatitis. A few doses of opium are occasionally necessary, if the pain is very acute; but the rapid improvement, if proper diet is provided, renders sedatives unnecessary in the great majority of cases. As a rule no drugs are required. But it must be repeated that rapid improvement is not to be looked for, unless all preserved foods are omitted from the diet. The writer has seen three cases, in which, although fresh milk, raw beef juice, and orange juice were freely administered, the pains did not subside until the patent food, which had been persisted in, was stopped. As soon as this was done, the subsidence of all scorbutic symptoms was immediate.

INFANTILE ATROPHY.

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THE term atrophy or wasting, when employed in pædiatric science, is an extremely useful and expressive one. We prefer to regard it as a generic term, not restricting it to those cases, which have their origin in some gastro-intestinal disturbance. In this way, when we come to consider the *Etiology* of this condition, we find that there are really two distinct varieties of infantile atrophy, viz., primary and secondary.

Primary infantile atrophy is the simple or true form, and occurs apart altogether from any other constitutional or organic disease. In such cases, the age of the infant bears a most important relationship in regard to its etiology. This form is most commonly met with during the first six months. It certainly becomes much less common towards the latter half of the first year. Indeed, we may take it that this class of atrophic infants either improves or succumbs before the end of the first year is reached. Heredity may play a certain part in its production, and the infant may thus be born with tissues, which are imperfectly developed, more especially those which have to do with digestion and absorption. Again, we meet with true infantile atrophy in cases where the patient has been born prematurely. Occasionally, we obtain evidence of succeeding children in one family, exhibiting symptoms of this condition, although born at full time, and in whose parents there was neither a tuberculous nor a syphilitic taint. It would seem as if, in these cases, there was a hereditary tendency to the reproduction of an imperfectly developed type of child.

In a few instances, a history of parental excess, alcoholic or otherwise, or of neurasthenia, may be obtained ; while, in some, the atrophy seems as it were an attempt on the part of Nature herself to exterminate what is destined to be an imperfect type of humanity. It must be admitted that many infants, suffering

from primary atrophy, are found to have been quite healthy and apparently well nourished at birth. In them, the condition comes on gradually, and may result from imperfect digestive or absorptive powers. Imperfect hygienic surroundings doubtless play no little part in the production of many such cases. Infants reared in damp, sunless, one-roomed dwellings, given out to nurse by mothers, who have to earn their daily bread, and whose skins are kept in a chronic state of dirt, are more than ordinarily liable to become marasmic. Such are the principal causes, that conduce to the primary form of infantile atrophy, and it will be observed that beyond the fact, that heredity and environment may have something to do with its production, practically little is known as to its ultimate cause.

Secondary infantile atrophy is a much more definite condition, when considered from the etiological point of view. It may be regarded as symptomatic atrophy, inasmuch as it is an expression or sign of certain diseased conditions. This variety never occurs without a distinct cause. It may be brought about by the existence of certain congenital defects. Thus, hare-lip or cleft palate, by interfering with the feeding of the infant, may lead to it. Hare-lip is readily recognised, while cleft palate may easily be overlooked. The latter is often associated with stomatitis, so that when an infant is brought with a history of wasting, for which no cause can be made out, and especially when stomatitis is present, the possibility of the existence of cleft palate should not be forgotten. Tongue-tie may, similarly, lead to atrophy, but this is obviously an extremely rare cause. Again, we may find the curious condition of congenital hypertrophy of the tongue present. A much more frequent cause of wasting is congenital pyloric stenosis. This is now a well-recognised condition, of which atrophy forms one of the most marked signs. So, too, congenital stenosis of the œsophagus produces marked wasting, as it leads to regurgitation of the food. Much less commonly, do we meet with infantile atrophy, which results from congenital absence, atresia, or other malformation, of portions of the alimentary tract besides those already mentioned.

Improper feeding, however, must be regarded as by far the most frequent cause of atrophy in infants. We use the term

improper feeding in the widest possible sense. It is intended to imply that, for some reason or another, the infant does not obtain the quality and quantity of nutriment sufficient for its own peculiar needs. Breast-feeding, the natural source of the infant's nourishment, is, at the present time, rarely satisfactory. Too often, we must admit, a healthy infant becomes the victim of marasmus from the day on which it is taken off the breast, and fed by hand. It is a well-known fact that many women give up nursing their infants, on the supposition that the milk is unsuitable, without any attempt being made to remedy any defect that may actually exist. Many a mother, if placed under better dietetic and hygienic conditions, might still continue, with advantage, to nurse her offspring. If imperfect breast-feeding is a source of marasmus, much more so is improper artificial feeding. Unfortunately, women are hopelessly ignorant regarding this subject ; and, consequently, they commit serious errors which are quite easily avoided. The use of an improper bottle, or the employment of an unsuitable milk-mixture, or of a condensed milk, which is deficient in fat, or, as too often happens, the too early use of artificial and starchy foods, will lead, sooner or later, to infantile atrophy. Again, as Hutchison has pointed out, an unsatisfactory teat, by preventing the infant from obtaining sufficient material from the feeding-bottle, will induce atrophy, although the infant's powers of sucking are unimpaired.

The well-known condition of infantile diarrhoea, associated or not with vomiting, quickly produces atrophy. This combination of diarrhoea and vomiting is rarely met with in breast-fed infants, but is extremely common in those who are artificially fed. An improper milk-mixture, a long tube bottle, or irregular feeding may conduce to it, while, in not a few cases, all three factors are at work. In some cases, if this state of things is allowed to go on unchecked, a chronic condition becomes established, and then the wasting is apt to become extreme, while broncho- and hypostatic pneumonia may ensue, and prolapso ani is extremely common.

Pertussis is not infrequently a cause of infantile atrophy. In quite young infants the spasm is not always present, so that when we have the history of cough, associated with vomiting and wasting, we should not forget that the cause of the trouble

may be pertussis, and not tuberculosis, as we are too apt sometimes to suppose. As the result of broncho-pneumonia ensuing after measles, or some other disease, infantile atrophy is very commonly met with. Indeed, we sometimes find atrophy, coming on after an attack of measles, in which no organic lesion can be made out in the lungs or elsewhere. The wasting, attendant on broncho-pneumonia, is due to impaired digestive and absorptive powers. Stomatitis, so frequently an accompaniment of broncho-pneumonia in infancy, sometimes appears to play a considerable part in the atrophic process. Chronic broncho-pneumonia may lead to atrophy, but it is not always easy to distinguish such cases from those of general tuberculosis, in which the lungs are specially involved. Again, wasting may be the only evidence presented to us of empyema. Cases of this kind are rare, perhaps, in infancy, but occasionally we do meet with this type of case. Even a simple serous effusion in an infant sometimes produces marked wasting.

Splenic anæmia as a source of wasting should not be forgotten. The pale face, the large spleen, and the sometimes remarkably wasted body form a striking clinical tripod. Another source of wasting is malignant disease, which usually takes the form, in infancy, of renal sarcoma. Atrophy, however, in such cases, is usually only present in the later stages of the disease. Idiocy, more especially of the Mongolian type, is sometimes associated with considerable wasting, but this is not by any means a constant phenomenon. Acute osteomyelitis is a source of atrophy in infants, which is worthy of notice, and is essentially an exhausting disease, and apt to produce many complications as the result of pyæmic infection.

Two very common, and most important causes of secondary atrophy, are undoubtedly tuberculosis and congenital syphilis. In not a few cases wasting is the only evidence to the physician of their existence. Fortunately, treatment and the hand of time serve to point to the correct diagnosis in all such cases.

The *Complications* of infantile atrophy are numerous. By far the commonest is erythema of the buttocks and genital region, while boils, and even abscesses, are apt to appear on different parts of the body. Even bedsores may be met with in very severe or neglected cases. Prolapsus ani may occur

even in cases where no diarrhoea exists. Vomiting and diarrhoea, on the other hand, are sometimes met with as actual complications. Bronchitis and broncho-pneumonia are very frequent, while in cases tending towards a fatal termination, collapse of portions of the lung, or it may be hypostatic pneumonia, may be found to exist. Head retraction is sometimes seen, and death may be ushered in by convulsions. Anæmia of greater or less degree is always present, but enlargement of the spleen is not found, save in cases of splenic anæmia and congenital syphilis. The presence of glycosuria must be regarded as an exceedingly rare complication, and it is certainly one which we have never seen. Its existence does not indicate diabetes, but is merely an evidence of faulty metabolism.

The *Diagnosis* of the primary from the secondary variety of infantile atrophy is, by no means, always an easy matter. The age of the patient is of considerable importance, as primary infantile atrophy is much less common after the first six months. Again, in the primary form wasting is much more likely to constitute the outstanding feature of the case. The history is of great assistance, and the possibility of a syphilitic or tuberculous taint should always be carefully enquired for. The existence of all possible conditions, likely to lead to atrophy, should be considered. By physical examination, we can often exclude a large number of causes which produce the secondary variety of infantile atrophy. More especially we would advise a careful examination of the mouth and chest, while every care should be taken to exclude œsophageal and pyloric stenosis. It is specially difficult to exclude tuberculosis as a cause of infantile atrophy. Even in the primary form of atrophy, we may find physical signs in the chest, suggestive of a tuberculous invasion, although such does not really exist. In such cases, we must largely depend on the history of the origin and progress of the case, while we should strongly suspect as tuberculous, all cases showing physical signs at the apices of the lungs. Even when every care has been taken in examining the patient, there will always remain some cases in which no definite diagnosis can be given as to whether the atrophy is primary or secondary. Personally, we believe that the more thorough and systematic our enquiries and physical examination

are, the fewer will be the cases, which we may legitimately classify as types of the primary form of this disease.

In every case of infantile atrophy, the *Prognosis* must be guarded, as in our experience, these patients not infrequently die quite suddenly, in spite of the fact that they were apparently improving, to judge by their gain in weight and generally better condition. The onset of diarrhoea, associated with vomiting, is always an unfavourable sign, while convulsions with or without head retraction must likewise be regarded as of evil omen. Pulmonary complications are perhaps the most dangerous of all. Otherwise many marasmic infants recover, provided they are placed under favourable conditions as regards treatment.

In the *Treatment* of infantile atrophy, prophylaxis is of first importance. Care should be taken from birth with regard to the feeding, clothing, and general hygiene of every infant, be it healthy or otherwise. It is an undoubted fact, that many infants would be saved from premature death, were parents and nurses better instructed as to the correct methods of infant management and hygiene. When we are face to face with a case of actual infantile atrophy, we must see that the feeble vitality of the patient is improved by wrapping the infant in layers of cotton wool. The dry wrinkled skin should be gently rubbed over twice a day with oil. Too frequent bathing must be carefully avoided. Complications need to be treated as they arise, and in every case stimulation, in the form of wine whey or brandy, is usually called for.

We shall now refer, at greater length, to the feeding of the patient, and our remarks will have a special bearing upon cases representing the primary type of infantile atrophy. These infants seem to lack the powers of absorption and of assimilation. It is, therefore, absolutely futile to attempt to feed them as one would normal infants. It is generally found that breast-fed infants present quite as great difficulties in management, as those who are brought up by hand. It, therefore, becomes sometimes necessary to wean them either partially or entirely. This must not be done unless we find that, after regulating the mother's habits, mode of life and diet, and, at the same time, seeing that the infant is nursed at sufficient intervals, the latter still continues to fall off in weight or remains stationary in this respect. When artificial

feeding becomes essential, then we must endeavour to find a suitable milk mixture for the patient. Such infants, it should be remembered, can practically never assimilate fat to any appreciable extent. Hence the mistake of administering cod-liver oil in such cases, as this only serves to still further disturb the feeble digestive apparatus. Proteid, on the other hand, is frequently tolerated with comparative ease. So too with sugar, which atrophic infants are able to absorb to a comparatively large extent. The milk mixture, which seems, *a priori*, to be best suited to such cases, is one containing a comparatively large amount of proteid and sugar and little fat. Such a food is obtained by using the sweetened brands of condensed milk, and, consequently, these are of the greatest service in the feeding of atrophic infants. They serve to bridge over the difficulty, until such time, as the powers of assimilation and of digestion have become sufficiently improved to enable the patient to be fed on fresh milk mixtures.

Recently, we have tried, with much success, the addition of sanotogen to ordinary milk, in the feeding of such cases. The good results obtained by Prof. Ewald of Berlin from the use of sanotogen, in enteric fever, led us to try it in cases of infantile atrophy, where we must have a food material, which is not only nutritious, but at the same time highly absorbable. It is perhaps necessary to point out that this preparation, which is essentially a food substance, contains 95 per cent. of milk albumen and 5 per cent. of glycerophosphate of sodium. Sanotogen is a fine white powder, having little or no taste. The combination of casein with glycerophosphoric acid apparently leads to some change taking place in the former, whereby it is rendered not only easier of digestion, but also more readily assimilated. The method we adopted, in using sanotogen, was to take half a teaspoonful of the powder, and mix it into a paste with water. Then the remaining amount of water, necessary to make up the total milk mixture, was added, and the whole thoroughly mixed. This was then placed in the feeding bottle, which contained the required amount of cow's milk, previously scalded. No cream was added, and, as a rule, no sugar was employed.

The two following cases illustrate very strikingly the value of sanotogen in the treatment of infantile atrophy:—

J. M., *set.* 2 months. "Has never got on since he was born." Third child. Labour normal, and at full time. No history of miscarriages, and other children quite healthy. Mother was somewhat anæmic, but father was said to be strong and well. At birth, the patient was small, but cried well. There was no history of syphilis. Weight 4 lbs. 3 ozs. Skin dry and harsh, with considerable erythema about the genitals. Physical examination of chest, abdomen, and mouth entirely negative. No vomiting or diarrhoea. Limbs cold and somewhat blue. Cry feeble. Breast-feeding had been tried to the end of the first month, and since then he had been fed on a milk-and-water mixture every two hours from a tubeless bottle, but the quantities of ingredients were never accurately measured. He was first put on equal parts of scalded milk and barley water every 2½ hours. At the end of a week, the weight remained stationary, and, in a fortnight's time, there was a loss of 2 ozs. He was now given scalded milk 1½ tablespoonfuls, water 2½ tablespoonfuls, and sanatogen a small half-teaspoonful every 2 hours. In a week, the patient had gained 1½ ozs, and, at the end of a month, the weight registered 4 lbs. 14 ozs. The amount of milk was now increased to 2½ tablespoonfuls. After this, a steady increase in weight was observed, so that at the age of 4½ months it was 7 lbs. 5 ozs. The mixture had been gradually increased in amount, so that the patient was now having 4 tablespoonfuls each of milk and barley water. It is perhaps well to remark that no complications occurred in this case. The improvement certainly dated from the time when sanatogen was added to the milk mixture, and it seems only fair that this preparation should be credited with the good results, obtained in this particular case.

E. W., *set.* 10 months. Had been wasting for fully two months. During that period, diarrhoea and vomiting had been going on. Patient was greatly emaciated, weighing only 6½ lbs. She had been brought up from birth on the bottle. Feeding was unsatisfactory in all respects. There were evident signs of rickets. The skin was very dry, and showed some seborrhœic dermatitis in patches. The cry was feeble, and the pulse weak, while the anæmia was extreme. There was no evidence, however, either of syphilis or of tuberculosis. She was put on equal parts of scalded milk and water every 3 hours. In four days the diarrhoea was less, but the vomiting continued. Half a teaspoonful of sanatogen was now added to the mixture, and presently the vomiting and diarrhoea entirely ceased. The weight began to increase with considerable rapidity, and in six weeks' time she had put on altogether 1½ lb. She was now taking pure milk with a small teaspoonful of sanatogen. Her condition steadily improved, and, after being put on cod-liver oil, in conjunction with sanatogen, she became quite a new creature. At the age of 15 months, she weighed 16 lbs., and had cut four teeth. She was now beginning to walk. No drug was used in this case at all to control the initial vomiting and diarrhoea, and although, at the start, the case seemed a very unpromising one, the result proved quite beyond our expectations.

The use of sanatogen, in these cases, proved so satisfactory that we have been encouraged to try it in other cases of infantile atrophy, and have had almost equally pleasing results in a number of patients suffering from this condition. It is quite apparent that sanatogen has considerable power in influencing nutrition. It is readily absorbed, and seems to possess a wonderful effect in increasing the nutritive value of

other food materials in cases of infantile atrophy. In this connection, we may refer to the experiments made by Fischer regarding the rapidity of proteid absorption. This observer proved that sanatogen was more rapidly absorbed by the stomach than egg albumen, or than casein dissolved by the addition of sodium. It is therefore well suited to the needs of those infants, who are unable to digest ordinary milk, or its substitutes. It would also seem to be indicated in other conditions, and already we have obtained excellent results from its employment in cases of malnutrition in older children, rachitis, scorbutus, and so-called debility. Our observations, in fact, coincide with those of Heubner, Auerbach, Frühwald, and others who testify to the increase of weight, and the improvement in nutrition of young patients, to whom sanatogen has been given. We accordingly suggest its use in all cases of atrophy, or of malnutrition, presenting themselves for treatment.

It is only, by regular observations of the weight of this class of patient, that we can really estimate the state of progress or otherwise. It is by no means unusual to find the parent complain that there is no improvement whatever, and, to all appearance, the patient may seem unaffected by the treatment, but if a gain in weight has been effected, then we may fairly conclude that the patient is improving. The gain is often very small at first, and indeed a loss may be the only result obtained from carefully prescribed treatment. In not a few cases, this is due to the fact that too strong a milk mixture has been ordered. As a general rule, we should begin with a decidedly weak milk mixture rather than one which to outward appearance is more nourishing. If ordinary milk proves unsuitable, then condensed, or even peptonised, milk may be tried, while in some cases whey mixtures seem most beneficial.



ON DISORDERS ASSOCIATED WITH PRIMARY DENTITION.

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A HUNDRED years ago, the great majority of all ailments to which infants are liable were attributed to the effects of dentition. The mortality from this cause alone was placed as high as 50 per cent.

About 50 years later, however, it was announced as a discovery that, after all, dentition was but a physiological process, and, as such, it could not very well be fatal, or even dangerous to life.

This produced a reaction. Although infants continued to suffer and to die, as still they do, of convulsions, meningitis, pneumonia, pulmonary, gastric, and intestinal catarrh, during the period of first dentition, these illnesses were no longer attributed to "breeding of the teeth." Dentition rarely finds a place in death certificates now.

Yet the public—whose information on medical matters is usually a century behind the times—still persist in regarding all complaints in early infancy as due to teething. "Is it his teeth, or is it consumption of the bowels?" "He always cuts his teeth with convulsions or bronchitis," as the case may be; "I thought it was only a teething rash"—are all common questions, and statements of which many of us must have grown weary, much as the Athenian tired of hearing Aristides called "The Just." Possibly, therefore, we may pay less attention to the phenomena of dentition than the subject merits.

Truth and fallacy, like poisons and their antidotes, often grow side by side.

Dentition is a physiological process, and, as such, is often accomplished without any disturbance to the infant's health.

On the other hand, it is futile to deny that it is often associated with considerable pain, constitutional disturbance, and local signs of inflammation in the gums.

In enquiring why this should be, we are handicapped, at

starting, by want of knowledge as to the exact method by which the eruption of teeth is effected.

Does the process resemble that which obtains in sharks, in which the mucous membrane, to which the teeth are attached, and of which they are a part, is shed in layers, thus bringing successive rows of teeth to the surface?

At all events, the shedding of the temporary teeth in human beings seems analogous.

Do teeth arrive at the surface through successive additions to the length of their fangs? Against this view, it has been urged that, occasionally, unerupted teeth are found with perfectly developed fangs. Yet this condition may be but as exception to the rule.

We may safely say that the old view that teeth literally pierce the gums—as a blunt awl might be driven through a cowhide trunk—and that all troubles, which may accompany teething, are due to resistance afforded to a tooth by a tough unyielding gum, is erroneous.

No gum, even if as tough as a turtle's, could withstand the passage of a tooth.

The superstrata of the gum over a tooth are gradually absorbed, or atrophied, not pierced. The process has been attributed to the action of phagocytes, but on what evidence I do not know.

The idea that teeth may be "liberated," or their eruption hastened, by lancing the gums must be discarded.

We must, however, leave undecided the exact nature of the forces which are concerned in dentition. We know no more about them than we do of those, which determine physiological processes elsewhere, such as the development of function in the salivary glands, the intestinal glands and the nervous system.

WHAT IS THE IMMEDIATE CAUSE OF PAINFUL DENTITION?

Some have held that a tooth acts like a foreign body, and causes pain by forcing its way through its closely packed neighbours in a small and over crowded jaw. I am not prepared to deny this altogether, for it is well known that an impacted wisdom tooth may give rise to much distress in after life. Yet, I think, an analogous condition in primary dentition must be rare, because, as a rule, the infant's pain

arises, when the tooth has outsoared its neighbours, and is nearing the surface of the gum.

I doubt again that pain is produced by resistance to the passage of a tooth by the gum above, unless indeed the gum be inflamed, for surely the resistance offered to the permanent teeth, by the deciduous teeth above them, must be far greater than any which the gum itself can afford. Yet eruption of permanent teeth is painless, unless the temporary teeth are carious, or the gums are ulcerated.

The inference, therefore, is that dentition is painful when the gums are so.

SYMPTOMS OF PAINFUL DENTITION.

The normal healthy child may have none save salivation, and the satisfaction which the child derives from biting and munching anything which he can put in his mouth.

If fretful, it is because he is not supplied with something to bite. A hard crust at once brings contentment. Mastication may accelerate the process of dentition, and Hippocrates was probably right in assuming that in these circumstances the gums itch. They are not, however, red or swollen, tender or dry. Pyrexia is absent.

The condition of a child, in whom dentition may be really painful, is wholly different from the above. Here the gums are swollen, tender, and reddened. They are dry, or covered with thick and slimy mucus. Salivation seems suppressed. Frequently this condition of gingivitis affects the gums as a whole. Less frequently, it is most marked over the site of an erupting tooth. One cannot doubt that, under these conditions, dentition may be painful. The child is restless, sleepless, or wakes at short intervals, screaming with rage and pain, and driving its parents to distraction. It ejects its "comforter," and the nipple of the breast, or bottle, with an angry cry. Evidently, pain and tenderness of the gums are increased by pressure. Often he pulls, and rubs his ears, or the back of the head, showing that his sufferings are referred to these parts.

The temperature is often alarmingly high, rising to 104° or 105° . With pyrexia there are, I believe, almost invariably, signs of gastro-intestinal disturbance, such as vomiting, with diarrhoea, and loose, offensive, green and curd-containing motions, and griping colic. Sometimes there is obstinate

constipation. Signs of pharyngeal, laryngeal, tracheal and bronchial catarrh are common enough. Nervous symptoms such as laryngismus, spasmodic cough, squint, muscular twitchings, tetany, convulsions may occur, but it is worthy of notice that these are far more prominent in edentulous, rickety subjects than in those who are cutting teeth.

The popular superstition that rickety children, who suffer from any or all of these symptoms, "cut their teeth in their loins" was no doubt invented by some medical man in bygone ages, in order to account for the fact that the teeth, which he had confidently predicted, failed to make an appearance in their normal site.

Convulsions are far more common in infants below the teething age than during it.

All the symptoms which have been mentioned, and many others, including so-called "teething rashes," which comprise every variety of dermatitis and exanthem; meningitis of every sort and kind; encephalitis, infantile paralysis, hemiplegia, paraplegia, diplegia, eye affections, such as keratitis, iritis, and optic neuritis; ear affections, such as otitis media and mastoiditis; pulmonary diseases of every kind have been attributed to teething. In short, there is no disease for which dentition has not been held to account. Of pulmonary disease, perhaps lobar pneumonia, and particularly apical pneumonia, have most frequently been mistaken for teething, the reason being that until within recent years its existence was denied in infants under two. Yet of all complaints in infancy, lobar pneumonia yields most striking indications of its presence.

When, however, pneumonic delirium has been mistaken for meningitis, and a crisis has happened with the eruption of a tooth, or has followed lancing of the gum, no doubt the happy event has been held to justify both diagnosis and treatment. One can only thus account for the strange conviction, dear to our parents and their medical advisers, that infants' lives are saved by timely use of lancets.

It would be strange indeed, if teething did not often co-exist with every illness in infants aged from eight months to twenty-four. Yet I am convinced that, in the vast majority of cases, teething is a mere coincidence. It is chiefly of importance when it occurs through inflamed gums.

One sees countless cases in which teeth are cut in the

course of any kind of illness, but without influencing its duration, and without evidence of alveolar inflammation. On the other hand, it is equally certain that alveolar inflammation and, therefore, painful dentition, are associated with every kind of illness, and with gastro-intestinal disturbance in particular.

This fact is admitted even by those, who are not disposed to regard dentition as the source of all evils—and the following explanations have been offered of coincident disorders:—

- (1) *The Reflex Theory.*
- (2) *The Pyrexial Theory.*
- (3) *Idiosyncrasy and General Nervous Instability.*

The reflex theory is fascinating in its simplicity and plausibility. The trigeminal nerve, which supplies the jaws and teeth, has extremely wide anatomical connections, as everyone is aware. It would be tedious to enumerate them. One need only allude to its communication with the facial, glossopharyngeal, and vagal nerves; with the sympathetic supplying the iris, at the gasserian ganglion, with the nerve to the membrana tympani through the otic ganglion.

Moreover, the nerve is not far from its origin in the medulla, where its nucleus is in close proximity to other important nuclei, and also to the base of the brain. Such being the case, it seems plausible to attribute all complaints of parts, however remote, to reflected irritation of the fifth nerve.

There may be a certain amount of truth in this, but it is not the whole truth. No doubt irritation of the dental branches of the fifth may produce otalgia, but it cannot produce suppurative otitis media. In rare cases, it may give rise to convulsions, but it cannot cause meningitis.

Spasmodic asthma, were the theory true, should be excessively common in teething infants, but it is of the utmost rarity. Pneumonia cannot be brought about by reflex irritation of the vagus. Whilst laryngismus and tetany, as before-mentioned, are practically confined to rickety children in whom dentition is delayed. And these are complaints which might well be produced by reflex irritation.

One may admit at once that pain in any part may be transferred elsewhere, yet disease is not set up in the remote

part to which the pain may be referred. Pain, in early hip disease, is commonly referred to the knee, in renal colic, it may be felt in the testicle, yet neither knee nor testicle is actually diseased. John Hunter's usual astuteness forsook him, when he attributed relapsing urethritis exactly resembling gonorrhœa, to the effects of teething.

The reflex theory will not wholly account for all the complaints which exist with painful dentition.

The pyrexial theory, again, is not entirely satisfactory. It is held that dentition produces high temperature, the pyrexia predisposes the patient to chill, and that chill results in catarrh and inflammation of pulmonary or alimentary systems. Here again the explanation is not quite acceptable. Why should dentition be associated with pyrexia? It certainly is not so unless painful, and why is it painful unless the gums are unhealthy and tender? Modern experiments seem to show that chill is not the potent cause of catarrhs and inflammation, which it was formerly held to be. They are due to microbic invasions, and not to exposure to cold alone.

Lastly, we have the theory that children at the dentition period are in a condition of exceptional susceptibility to various complaints, because not only their teeth, but the glands of the alimentary tract, and their nervous system are undergoing physiological development.

Such physiological processes, without doubt, are proceeding, but it seems unjustifiable to blame nervous, or intestinal instability, when other, and more obvious, causes of illness may be found. I doubt if any previously healthy child suffers by reason of the "instability" of its nervous system, or the development of its physiological functions. If there is any special susceptibility at this age, it is to the ill-effects of sour milk and improper food, which susceptibility need not be regarded as an idiosyncrasy. This I believe to be the crux of the whole matter.

In my personal experience I can hardly recall a case of painful dentition, which has not been accompanied, and usually preceded, by gastro-intestinal disturbance.

It is in connection with constipation or griping colic, diarrhœa, with offensive, green, curd-containing stools, that we find dry, tender, swollen gums, which, in my opinion, render the eruption of teeth painful. Over and over again, mothers have complained

that, whereas a child has previously cut several teeth without discomfort, on this particular occasion a tooth is being cut with diarrhoea, and all the familiar symptoms of fever, fretfulness, insomnia, screaming, perhaps convulsions, and obvious pain in swollen, inflamed gums. In practically all such cases, improper diet or tainted milk is the cause, and the symptoms speedily subside under castor-oil and careful dieting.

One is compelled to regard the oral condition as part of the intestinal, rather than to consider the abdominal symptoms as due to reflex irritation from the gums.

In favour of such a view may be mentioned the well-known fact, that, in adults, a raging toothache may often be relieved by a brisk purge. Sir Lauder Brunton explains this by supposing that "The state of the nervous system is so altered by the purge that pain is no longer produced by the irritation."

Yet I venture to think that a more reasonable explanation is that the cause, which irritates the intestines, irritates a tender tooth—and that this cause is removed by the purge.

It must be a common experience that acute indigestion gives rise to tenderness of gums, toothache, and neuralgia. The mouth is part of the alimentary tract, and the teeth and gums are part of the mouth, and therefore share in the general disturbance caused by indigestible and irritant matter in the intestines.

I believe, therefore, that the ordinary phenomena of painful dentition are dependent on alimentary disturbance, and that dentition is painful because the gums become unhealthy.

Assuming this to be true, it affords an explanation of many of the more serious complaints, which occur together with painful dentition.

If the oral mucous membrane is unhealthy, it must follow that it is unable to cope with the invasion of microbes. As previously mentioned, salivation seems suppressed during painful dentition, and healthy saliva has, no doubt, antiseptic properties. Hence we can easily see why infants, whose teething is painful, fall a ready prey to catarrhal inflammation of the ears or lungs, to pneumonia, and meningitis. A sore mouth readily becomes septic. With regard to ordinary infantile convulsions, attributed to teething, I am convinced that gastric, or intestinal disturbance, is far more frequently the cause than dental irritation.

TREATMENT.

If the foregoing conclusions be correct, the success of ordinary methods of treatment in cases of painful dentition is explained, and, possibly, some of the more remotely associated affections may be prevented by attempts to render the mouth aseptic.

General preventive treatment consists in scrupulous attention to form and mode of preparation of diet. If the child's food is unwholesome, its alimentary tract will be unhealthy.

When sour milk in unclean bottles has set up diarrhoea and colic, the best remedy is castor oil in emulsion with a little tincture of rhubarb.

R. Olei Ricini	-	-	-	-	m. x.
Tinct. Rhei	-	-	-	-	m. v.
Glycerini	-	-	-	-	m. v.
Tragacanth	-	-	-	-	gr. $\frac{1}{2}$
Aq. Menth. Pip.	-	-	-	-	ad 3 i.

To this may be added Tr. Opii, in doses of 1 or 2 minims, if pain is extreme. The prejudice against giving laudanum to infants is groundless, except perhaps in those under the age of dentition. There is little danger in giving it even to these, provided that the dose be not too large, and that it be not repeated, until drowsiness produced by it has passed off.

Salol may be added to the mixture, when motions are peculiarly offensive, and bromide of potassium, when restlessness and sleeplessness are pronounced.

Oral hygiene is of the utmost importance in teething infants. That which entereth the mouth defileth, and a teething baby puts everything therein which is possible of insertion.

Hence a reasonable discretion should be used in the selection of articles supplied for the purpose.

Rubber rings, "comforters," dolls' heads and the china ornaments on the mantelpiece should be washed before sucked. There is danger in the oft-sucked toy.

Nurses, who possess a very Baalbec of ruined teeth, should not indulge in preliminary suction of the bottle to make sure that the nipple draws, and that the milk is to the baby's liking.

Even "Walker-Gordon" milk should not be stored in the lavatory, the outside, as well as the inside of a feeding bottle should be kept clean. Every baby should possess its own pocket handkerchief, and a badger-hair gum-brush.

When the gums are painful, tender and congested, they should be brushed with a solution of 10 grains of chlorate of potash to the ounce of glycerine of borax.

Should ulceration be present, the addition of 20 to 30 grains of resorcin to the above, and of a few grains of chlorate of potash to the castor-oil mixture, are most efficacious.

GUM LANCING.

In the *American Journal of Dental Science*, it is said, p. 327, that: "Many lives of children are probably sacrificed yearly, because of the popular and professional prejudice against lancing." Such statements are pious opinions which lack confirmation.

Personally, I have grave doubts that painful dentition has ever been the direct cause of death, or that life has ever been saved by lancing the gums. Even the oft-quoted cases of fatal so-called "teething convulsions" are, in my experience, attributable to gastro-intestinal disorder. It is difficult to believe that "threatened meningitis," whether tuberculous or otherwise, has ever been averted by use of the lancet, or that the crisis in pneumonia can be hastened, or diarrhoea cured, by such procedure. At the same time, there can be no doubt that local pain may be relieved by blood-letting.

Simple scarification of the gum is all that is needed. Such barbarous usage as the removal, between elliptical incisions, of a portion of gum over a tooth, supposed to be offending, is not to be commended. As well as being cruel, it is illogical; for if the condition of the gum were merely that of tension over a tooth, a simple incision should gape at once, and so relieve the symptoms.

Gum-lancing should not be practised in the absence of local indications for its use, and merely in blind hope of relieving "constitutional symptoms and distress not otherwise accounted for" (*Op. cit.*, p. 327). If unaccounted for, further investigation is required, not stabs in the dark. At the present time, it is hardly likely that the purple hæmorrhagic swellings of the gums, met with in infantile scurvy, should be mistaken for signs of disordered dentition, requiring local venesection. Yet there is ground for suspicion that, in former days, many a case of scurvy was so maltreated and ended fatally.



DISEASES OF THE EYE IN INFANTS.

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IN considering the diseases of the eyes which occur in infants during the first six months of life, it will be convenient to arrange them under the three following headings:—

- I.—*Congenital Malformations.*
- II.—*Ophthalmia Neonatorum.*
- III.—*Syphilitic Affections.*

I.—CONGENITAL MALFORMATIONS.

There are numerous congenital malformations of the eye which occur in the newly-born infant. Of these, the following may be met with. The eyelids may be absent (*ablepharon*). Occasionally there are fine strands of tissue near the outer canthus, extending between the margins of the lids (*congenital ankyloblepharon*). There may be congenital slits in either eyelid, more frequently seen towards the inner aspect (*congenital coloboma*); these may be multiple. This is frequently associated with a congenital cyst of the conjunctiva (*dermoid cyst*). In the *Transactions of the Ophthalmological Society*, Vol. XXIV., pages 325–329, there is a record of an interesting case, by Mr. N. Bishop Harman, of a child with multiple congenital abnormalities, which include two colobomata of the eyelids, two dermoid cysts of the conjunctiva, and, in the left eye, a coloboma of the iris and choroid. A crescentic fold of skin may project in front of the inner canthus, which gives rise to a broad appearance at the root of the nose, a condition known as *epicanthus*. The plica semilunaris may be larger than normal. Nævi or angiomas not infrequently occur on the upper lid towards the nose, and may consist of large venous spaces (*angioma cavernosus*), or simply dilated fine capillaries (*teleangiectasis*).

Muscular paralysis.—Any of the eye muscles may be partially paralysed, completely paralysed, or insufficiently developed at birth, but those most frequently involved are both the levatores palpebræ superioris, producing a drooping

of the upper eyelids (*ptosis congenita*). As a rule, however, the paralysis is not complete, and this is frequently associated with incomplete development of the superior recti muscles.

The only other congenital malformations of the conjunctiva which need be mentioned are the dermoid cysts, already referred to, and a very rare condition, in which the eyeball, which is small (*microphthalmos*), is covered by an opaque thickened membrane instead of the clear conjunctiva. Besides a persisting fronto-nasal fissure, which may interfere with the formation of the nasal duct, the duct may be quite normally formed, yet the fold of mucous membrane, which is placed at the lower end of the nasal duct, remains unobliterated in the inferior meatus of the nose. This, when the tears are secreted, gives rise to *epiphora*.

There is a rare condition known as *infantile glaucoma*, *congenital hydrophthalmos*, or *buphthalmos*. In such a case, the child is born with enlargement of the eyeballs, and it will be found that the corneæ are enlarged and cloudy, the intraocular tension is raised, and that blindness is the accompaniment. The cause of this condition is obscure, but it has been attributed to iritis, occurring *in utero*, interfering with the proper circulation of the fluid in the eyeball, and so producing a rise in the intraocular tension, this causing the delicate tissue of the infant's eyeballs to bulge, a condition due to the fact that the cornea and sclera have become thinned, hence the large anterior staphyloma.

The iris may be absent (*aniridia* or *irideremia*). In such a case there is generally a small ring of iris tissue at the periphery, and there may be a congenital pear-shaped slit in the iris, placed usually downwards and inwards. The slit is complete and goes right up to the iridic angle (*coloboma iridis*). This deformity is due to incomplete closure of the choroidal fissure. Occasionally the coloboma is continued into the ciliary body, choroid, and retina, and in some cases there is a small depression in the lens opposite to the site of the coloboma. With this deformity, the eyeballs are sometimes found to be no larger than a pea, and they lie far back in the orbit, and may not be discovered during life, and therefore appear to be absent (*anophthalmos*). The pupil is sometimes found to be eccentric (*ectopia pupillæ* or *corectopia*). The two

irides may differ in colour (*complete heterochromia iridis*), more commonly, however, one segment of the iris may differ from the remaining portion in colour (*partial heterochromia iridis*). Occasionally there may be little or no pigment in the iris or choroid, both of which structures then have a pink appearance (*albinism*). In well marked cases of this condition, the young child develops photophobia and nystagmus. In the pupil there may be seen fine hair-like processes, which stretch from one side to the other, but which do not interfere with full dilatation of the pupil. These are the remains of the fine blood-vessels of the foetal pupillary membrane.

It is unusual to find the lens congenitally misplaced. When this does occur, the condition is usually bilateral, the lenses being located upwards (*ectopia lentis*), and is due to arrested development of the suspensory ligament of the lens. These displaced lenses may be cataractous. The anterior surface, or more rarely the posterior surface, of the lens may be cone-shaped (*lenticonus*).

Congenital Cataract.—There are many forms of congenital cataract besides the condition just mentioned. Anterior polar or anterior capsular cataracts, which may be pyramidal, are due either to the remains of the capsulo-pupillary membrane, or to intra-uterine iritis, or perforation of the cornea due to ophthalmia neonatorum. These may be readily seen.

Posterior polar, or posterior capsular, cataracts occur, these are either due to the remains of the hyaloid artery, which is the central terminal branch of the arteria centralis retinae, and which runs to the centre of the back of the lens capsule, or they are secondary to inflammatory conditions of the choroid and vitreous. Both anterior and posterior polar cataracts prevent the child from acquiring central vision, and therefore cause nystagmus. Congenital lenticular cataracts are usually partial and may be perinuclear or lamellar, fusiform or spindle-shaped, central, and punctate.

Glioma retinae may occur in very young children, and is said to commence sometimes *in utero*. The tumour grows rapidly, and produces a grey pupillary reflex. This disease must be diagnosed from chronic plastic uveitis. In the former condition, the tension of the eyeball is either normal or increased; in the latter, it is usually diminished. As soon as

a glioma retinae is diagnosed, the eyeball should be removed ; if, however, the tumour has already perforated the globe, the whole of the orbit must be cleared out, and in some cases it may be necessary to remove the periosteum.

II.—OPHTHALMIA NEONATORUM.

The most serious disease to which the newly-born child is subject is *Ophthalmia neonatorum*. This differs from most of the conditions referred to above, in that it is, unfortunately, frequently met with, and is one of the commonest causes of blindness in children. This is the more to be deplored, for, if due care had been exercised, and proper precautions taken, by those who were in attendance at the birth of the child, so terrible a disease could have been, in most cases, prevented. As the child's head passes through the vagina and vulva orifice, either a simple leucorrhœal, or a gonorrhœal discharge, from the maternal parts, is liable to penetrate the palpebral fissure of the child and infect the conjunctival sac. In the worst cases, the gonococcus is the cause of the disease, but pneumococci and streptococci may also cause a mucopurulent discharge. The lachrymal secretion, by its cleansing action, to a great extent prevents, or tends to prevent, any infection of the conjunctival sac, but the tears are not secreted until after the lapse of many weeks from birth, so that, when once these micro-organisms have invaded the conjunctival sac of the newly-born child, they produce acute infective inflammation. In some cases the infection is derived from the mother after birth, or, if the child is in an institution, from another infective case. In from two to four days after infection there is an acute purulent conjunctivitis, or, as it is often called, *Blennorrhœa neonatorum*. This is characterised by swollen red lids, which are frequently stuck together. When these are carefully separated, as they must be, a profuse purulent discharge is observed, and when this is removed, it will be seen that it is the palpebral conjunctiva which is most affected. If the disease is not recognised, or remains for a time untreated, the corneal epithelium will become infiltrated, and will then exfoliate, leaving a superficial ulcer, which will rapidly spread, involving the substantia propria of the cornea. The posterior elastic lamina of Descemet is likely then to protrude through the

base of the ulcer, producing a *keratocele*. Complete perforation then ensues. These changes occur very rapidly, and, when it is remembered that the cornea of a newly-born infant is scarcely 1 mm. in thickness, it can be readily understood how soon the aqueous chamber may be involved, and the whole eye be consequently in danger. Should the keratitis stop short of perforation, the cornea will become nebulous, or even leucomatous, while later the delicate nebulous cornea may bulge (*anterior staphyloma*). In some cases following corneal perforation the iris prolapses into the hole and becomes adherent, producing a white patch in the cornea, with the iris adherent behind (*leucoma adherens*). Occasionally an anterior capsular or pyramidal cataract follows perforation of the cornea. In some cases, however, pus gets into the aqueous chamber (*hypopyon*), and, with this, plastic iritis occurs. In the worst cases the infective inflammation spreads from the iris to the ciliary processes (*septic iridocyclitis*), thence to the vitreous chamber (*septic uveitis*). The eyeball then becomes an abscess cavity, which subsequently ruptures and ultimately shrinks (*phthisis bulbi*). From the above processes it will be seen how the sight is interfered with, and how blindness may ensue. The treatment of the disease may be conveniently described under the two headings—

(1) *Prophylactic.*

(2) *Curative.*

(1) *Prophylactic Treatment.*—If the mother is suffering from gonorrhœa, every effort should be made to cure it before parturition. Should it be discovered that there is a vaginal or vulval discharge before the head of the child engages the brim of the pelvis, the vagina and vulva should be washed with an antiseptic solution, such as 1 in 2,000, followed by 1 in 4,000 perchloride of mercury solution. In all cases directly the child is born, its face should be carefully washed over with water which has been previously boiled, especial care being taken to thoroughly remove any discharge, which may have got on to the eyelids of the child. During the first bath the water used for the body must *not* be allowed to come into contact with the child's face. Should it be suspected that the vaginal discharge has entered the palpebral fissure, and infected the conjunctival sac, as soon as the face has been thoroughly

washed, the eyelids must be separated and the conjunctival sacs washed out with a warm solution of mercuric chloride (1 in 6,000), boric acid lotion (5 grains to the ounce), or sodium chloride solution (3 to 4 per cent.). If these are not at hand, water which has been previously boiled, and allowed to become cool, may be used. The main point to keep in mind is, the early washing of the conjunctival sac with *a warm weak antiseptic or aseptic solution*. Strong antiseptics must not be used for fear of injuring the surface epithelium of the cornea, which, in so young a child, is very delicate. After the eyes have been washed out, as indicated above, one or two drops of argyrol (20 per cent.) may be put into each eye, or one or two drops of a solution of silver nitrate (4 grains to the ounce of distilled water) may be put into the eyes, but this should be followed by a thorough wash-out with a warm saturated solution of sodium chloride. The eyes must then be carefully watched for two or three days in case there should be any purulent discharge from the conjunctival sac. Silver nitrate should not be introduced indiscriminately into the eyes of all newly-born children, but only into those in which one suspects infection. The method advocated by Credé, and adopted by many surgeons, is to put into the eyes of all children soon after birth a few drops of silver nitrate solution (2 per cent.). This, may produce a mild catarrh, but it is said that there is no fear of any corneal opacities following, though the superficial layers of the corneal epithelium must become affected by the silver salts.

(2) *Curative Treatment*.—If it is observed that the eyelids of the child are red and swollen, they must be very carefully separated, and all discharge washed away with warm mercuric chloride solution (1 in 5,000), and this should be continued every hour throughout the day, and night, so as to completely wash away all discharges. After the first washing with the mercurial chloride solution, the cornea must be very carefully examined for the purpose of ascertaining whether it is quite clear, steamy, ulcerated and infiltrated, or perforated. This examination is somewhat difficult to perform, because of the small size and delicacy of the parts. It may, however, be effected by fixing the child's head between the surgeon's knees, which have been previously covered with a macintosh

and towel, and by then gently separating the lids with small lid retractors, great care being taken not to exert *any pressure* upon the eyeballs, otherwise rupture of the globe may occur, the lens escape, and blindness naturally follow. After this examination is concluded, the eyelids must be carefully everted, again bathed with the warm mercuric chloride solution, and then dried with sterilised swabs. The palpebral conjunctiva of both lids must then be painted over with a solution of silver nitrate (10 grains to the ounce of distilled water), and the conjunctival sacs *immediately* washed out with a warm saturated solution of sodium chloride in order to neutralise the effect of the silver nitrate. This may be repeated on the next day, and, if necessary, on the following days. This treatment should only be undertaken by the surgeon, for very great care must be exercised to prevent the silver nitrate from coming into contact with the cornea, which *must be preserved from injury*, since upon it depends the integrity of the other structures of the eyeball. More recently a 50 per cent. solution of argyrol (silver vitellin = 30 per cent. silver nitrate) has been used for painting the lids, or it may be dropped into the conjunctival sac. Argyrol is certainly less irritating than, and is quite as effective as, silver nitrate. According to Dr. Angus McGillivray, bacteriological experiments have shown that argyrol is more effective in killing micro-organisms than silver nitrate, in the strengths in which the latter can be tolerated in the eye. Should the cornea be at all hazy, it is well to drop into the eyes, twice daily, a solution of atropine sulphate (2 grains to the ounce of distilled water). The effect of this is to widely dilate the pupil. It tends to prevent iritis, and, should perforation of the cornea occur, it prevents anterior synechiæ from forming. The margins of the eyelids should be smeared with a little spermaceti ointment or unscented vaseline, to prevent the lids from becoming adherent, during the time that the child sleeps, and, on no account, must the eyes be bandaged up. This treatment must be persevered with for a week or ten days, when, as a rule, the discharge ceases. The cornea rarely escapes altogether, and, if none of the severer complications arise, it is usually found to be nebulous; this will require the local application to the lid margins of an ointment, made up of yellow mercuric oxide ointment, one part; and of

soft paraffin, three parts. A piece about the size of a small pin's head must be brushed inside the margin of the lower lid every night. This must be persevered with for many months, though, as a rule, the cornea does not become completely clear.

III.—SYPHILITIC AFFECTIONS.

Syphilitic affections of the eye very rarely manifest themselves during the first six months of life, but the one which demands attention is *iritis*. This may occur *in utero* (H. Juler). In his well-known book on syphilis, Mr. Jonathan Hutchinson states that he has personally observed 23 cases of iritis in infantile syphilis. The age of from three to five months is the period during which it manifests itself, but it may occur in infants so young as six weeks. It may be unilateral or bilateral, and is more frequent in females. There is only a slight circumcorneal zone of injection, but the effusion of lymph into the aqueous chamber is very free, so that posterior synechiæ are frequent, and the pupil may become occluded while the cornea usually remains unaffected. The diagnosis may be more readily made by observing other signs of congenital syphilis, such as skin eruptions, "snuffles," condylomata, and cachexia. "Most of those who suffer from syphilitic iritis are infants born within a short period of the date of the primary disease in their parents" (Hutchinson). The disease is one which is frequently overlooked, and this is not to be wondered at, considering that the symptoms are so slight, and that a baby usually keeps its eyes shut. Hence, whenever a young child presents the symptoms of congenital syphilis, its eyes should always be carefully examined. It is well known that, frequently during the examination of the eyes of children or adults, after using a mydriatic, posterior synechiæ may be seen, or uveal pigment may be observed upon the anterior capsule of the lens; while all history of antecedent inflammatory attacks in the eyes is persistently denied. It is possible that these are cases in which iritis has occurred *in utero* or in infant life. The treatment for infantile syphilitic iritis is, the local use of atropine (two grains of atropine sulphate to the ounce of distilled water) and the inunction of diluted mercurial ointment.

DISEASES OF THE SKIN OF THE YOUNG CHILD.

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THE various pathological changes, which may involve the skin of the newly born child, may be conveniently arranged for discussion in several categories.

Firstly, there is the group of developmental anomalies or formative dystrophies. A general anarsca, for example, may be symptomatic of different visceral defects. Then we have the various monstrous deformities, local, or more or less generalised, grouped under the term Elephantiasis. There are cases of atrophy of subcutaneous tissue, and absence of skin in parts, or of hair or nail formation. Further, we have the vast array of formative dystrophies, arranged under the name Nævus, including not only blood and lymph vascular lesions, but malformations of various other components of the skin, such as pigment, hair, nail, fibrous and fatty tissue, &c. Such dystrophies are often only stimulated into activity later in life. Generalised abnormalities in the process of keratinisation of the epidermis may be present at birth, causing the so-called "harlequin foetus," or a somewhat similar, but slighter, condition, known as ichthyosis, may occur or generally show later. Keratoderma may be localised to the palms and soles. Then, again, remarkable qualities may be innate, and a striking example is afforded by the condition, known as epidermolysis, in which all sorts of slight traumas, innocuous to healthy skins, readily provoke the formation of phlyctenæ. Of a somewhat different etiology probably are certain eruptions, which usually evolve in later life, but are occasionally congenital. Such are urticaria pigmentosa and xanthoma. The disseminated, slightly raised, tawny erythematous blotches of urticaria pigmentosa, with their urticarial element, tend to flatten down into tawny stains, but may be quite nodular, and so closely simulate that rarely congenital eruption xanthoma.

Such affections we shall not further refer to, as their occurrence is beyond our control.

In a second group of maladies, transmissible from parents to the foetus, is included the important infection, *Syphilis*. In rare instances, syphilis may be inoculated at, or after birth, but is usually contracted by heredo-contagion. The infected foetus may perish in utero, or be born with symptoms of the infection—a grave condition. A bullous syphilide, especially involving the palms and soles, is described as present at birth, or soon after, but must not be confounded with epidermolysis. Usually the symptoms declare in the first three to eight weeks. Prior to that, the infant may appear healthy, but is often ill-nourished, and acquires a characteristic earthy, or *café-au-lait* cachectic aspect, with a senile, wrinkled face. The nasal mucous membrane is early affected, causing the child to snuffle, and, similarly, the laryngeal catarrh brings about a hoarse cry. Too much significance must not be attached to snuffling, which has other causes. The eruptions bear a striking similarity to those seen in acquired syphilis, both as regards the morphology, colour, infiltration of the dermis, and absence of itching. Certain sites of predilection, such as the napkin region and face, give a somewhat special picture. The bulk of the eruptions are maculo-papular and papular of all sizes, as in the adult, lenticular, discord, annular, with a narrow or broad border, but the miliary follicular grouped syphilide is not seen. Papules are generally smooth, but may be scaly, and confluent to form large degenerating areas, especially on the hands and feet. Condylomata are common, and are not infrequent about the anus in relapses. The rarer acneiform, varioliform, and ecthymatiform syphilides may be puzzling. Plaques in the mouth, in my experience, are uncommon. Around the mouth, deep radiating fissures may form, leaving scars. Valuable corroboration of the existence of syphilis may often be derived from the family history, the condition of the eyes, periosteal thickening of bones, separation of epiphyses causing pseudo-paralysis, dactylitis, enlargement of the liver, spleen, and testicles. If one or both of the parents are known to be syphilitic, the possible effects on the expected offspring can be enormously mitigated by proper treatment of the mother. Syphilitic nurslings respond in a remarkable way to mercurialisation. Inunction is much used, but I prefer the ingestion of Pulv. hydrarg. \bar{c} . Creta, one grain twice or thrice

daily. It is extraordinarily efficacious, well borne, and convenient. The possible ill-effects on the teeth of a long course of mercury should be borne in mind.

Tuberculous skin eruptions, as the so-called *Acne scrofulorum*, and disseminated tuberculous "gummata," forming cold abscesses and dactylitis, are rarely seen until later months, as they are due to acquired tuberculosis.

In a third group are acquired maladies, possibly of systemic origin. *Sclerema* is a mysterious malady of nurslings, now comparatively rare, but formerly of frequent occurrence in association with bad hygienic conditions. Clinically, it is characterised by an induration of the integument, more or less generalised, and fixing the skin to the underlying parts, not pitting or pressure, and often rendering the infant immobile, with contracted limbs. It is associated with cyanosis, marked lowering of the temperature, and slowing of the pulse and respirations. It simulates, in some measure, some forms of scleroderma of the adult, and must not be confounded with some forms of pitting oedema. In the later stages of involution, the doughy lumps left may suggest growths or gummata. This process usually creeps up insidiously from the lower extremities, and may set in shortly after birth. It was formerly very fatal, but all the cases I have seen have gradually recovered. The indications are to nourish the child in every way, and keep the temperature to the normal as far as possible. Massage is also useful as are also oxygen inhalations.

Regional, or more or less generalised, *exfoliations* are not rare. A simple hyperæmia is said to exist frequently in the first days of extra-uterine life. It dies away spontaneously, leaving here and there some desquamation. Parrot said it might be accentuated and prolonged in feeble infants. Kaposi considered this exfoliative erythroderma an exaggerated physiological process. Others regard it as pathological, and Ballantyne mentions an acute specific fever in utero as a possible cause of some cases. We may remind the reader also of the existence of diffuse exfoliations in connection with confluent syphilides, dry eczema (*eczema seborrhoicum*), and the simple dermatitis to be presently described. Ritter von Rittershain, of Prague, described a *Generalised Exfoliative Dermatitis*, occurring in a foundling hospital. Of 297 cases, 50 per cent.

proved fatal. He considered the affection septicæmic. It began from the second to the fifth week after birth, with redness, dryness, and slight desquamation of the lower face, fissuring of the commissures, and erosion of the buccal mucous membrane. The erythrodermia then extended over the whole body, and the epidermis might be lifted up by vesicles and bullæ, and hence crusts and desquamation followed. Naturally boils, abscesses, &c. formed from secondary microbic contaminations. Sporadic cases are met with, from time to time, which seem to fall into this category, but nothing on the scale, described by Ritter, has been observed since. It reminds one of the epidemic eczema-like dermatitis described by Savill in adults.

French authors describe an eruption named, provisionally, *Simple Infantile Dermatitis*. The erythematous phase is characterised by a red, hot, swollen, shining skin, which may be complicated with painful fissures, oozing, excoriations, in the folds of skin especially. Simple hyperæmia dominates the scene. Abundant consecutive desquamations may follow. In very slight cases, the perianal, genital, and buttock regions may alone be involved, or it may be more extended. This phase may be fugacious, but it often passes into a second stage of *erythemato-vesicular dermatitis*. Short-lived vesicles form on the hyperæmic ground, and on the borders, and, in typical cases, the convex regions, *i.e.*, those more exposed to traumatism, are seen to be dotted with little erosions, more or less deep, from a puncta to a lentil in size, which may join to form polycyclical figures. These vesicles are seen in all stages of formation, drying, and healing. This second phase is frequent in debilitated infants, in the first weeks of life.

A third *papular phase* may form with surprising rapidity, by the budding of the floor of the vesicles, to form papules, varying in size from little pin-heads to a lentil, rather flattened, brownish or violaceous red in colour. They may be few or numerous, and the intervening skin may be healthy, or sown with brownish taches. This phase also may disappear spontaneously. Parrot described, and figured this phase as a characteristic lenticular syphilide. Abortive papules may co-exist with redness of certain regions, with erosions of different degrees, with vesicles in various stages. Lastly, *ulceration*

may set in, and may be isolated or confluent. The etiology is obscure and diagnosis difficult. The generalised erythematous or erythemato-squamous phases cannot well be confounded with an eruption of one of the acute specific fevers, or toxæmic, rashes. Other forms may cause confusion with scabies, lichen urticatus, and the papular form, especially with a syphilide. The papules of this dermatitis have a fine raised peripheral puckering, never seen in a syphilide. Local treatment, in slight cases, consists in cleanliness and protection of the surfaces from traumatisms and fæces and urine. The general health of the child must be studied, and the feeding, in case that should be the cause.

The forms of eruption, comprised under the term *Eczema*, are very frequent in the early months of life. The morphology is so well known that we at once discuss the etiology. In the first place, certain irritants—such as the sun's rays, arnica mercury—may excite a dermatitis indistinguishable, morphologically, from true vesicular eczema. The reaction subsides with the cessation of the traumatism. It is important to note that there may be a contributory cause in idiosyncrasy, or a depraved state of the tissues. More debatable are the propositions (1) that, given an inflamed patch, a corresponding patch may arise on the other limb, and (2) that other patches may arise. Here we have the action of nervous reflex, or, in the latter case, possibly secondary microbes. Another form of traumatism is microbic, perhaps primary, but certainly very often secondary to simple traumatism, or pre-existing eruptions. The occupation "eczemas," such as that of the washerwoman, grocer, or baker, are probably of such nature. When an eczematoid dermatitis is engrafted on a pre-existing condition, we say the skin has become "eczematised," to mark the distinction from primary vesicular eczema, which is amicrobic in origin. The latter has an obscure etiology, but there is a very widespread belief that digestive and metabolic troubles are an important factor. Perhaps the nervous system also has an influence. Now in the infant "eczema" is often attributed to reflex influence from dentition, and the nerve reflexes are certainly highly developed and extended, compared with the adult. This influence is greatly exaggerated. Next, complex troubles of the alimentary and assimilation functions

are almost universally incriminated. It is impossible to prove such a causation in the majority of cases. Dr. Arthur Hall, of Sheffield, strongly advocates a traumatic origin. He insists on the significant fact that, in almost every case, the eczema commences on the scalp and face, and descends over the limbs and trunk, as in the so-called eczema seborrhoicum of adults. He points out that the scalp is the most exposed part of the new-born, and he contrasts the conditions in utero with the after sudden exposure to change of temperature, soaping, insufficient drying, &c. If traumatic in origin, one would also expect eczema to originate in the napkin region. Allusion should be made to the possible starting of eczema in the incrustation, which is commonly found on the scalp of new-born children. Eczema in the infant is rarely of the primary vesicular type seen in some adults. It almost always begins in dry patches, which may readily become "eczematised," and its spread, downwards from the head, is very peculiar.

The indications for treatment are, in the first place, to thoroughly investigate the possible action of any of the causes mentioned. The feeding should be carefully regulated in respect to quantity, quality and time, whether the infant is breast or artificially fed. If the general nutrition is lacking, it should be promoted on suitable lines. Many babies, apart from their eczema, look pictures of health, but they may be athreptic, syphilitic, rachitic, or otherwise lowered in health. The scalp should be kept carefully cleansed and dried, and strong soaps avoided. Special attention should be given to cure any catarrhs of the eyes, nose, ears, or genitals. The presence of pityriasis of the scalp in the parents should be investigated. There are three fundamental rules in the local treatment:—

(1) A complete and repeated cleansing away of all scales, serous discharge, pus formation, and resulting incrustation. This must be accomplished by unirritating methods, such as gentle bathing with tepid thin strained oatmeal gruel, softening of crusts by olive oil, boric acid fomentations, or cold starch poultices.

(2) Scratching and rubbing must be prevented by (a) soothing applications, (b) controlling the hands. Cardboard splints are excellent, and do not give the feeling of restraint

caused by pinning, or tying the arms down. Boring of the head is more difficult to prevent.

(3) Inflamed surfaces must be treated by a suitable medicated dressing, and an occlusive one helps to protect the skin, whether in the form of compresses of muslin, or lint, spread with salves, or of pastes or varnishes.

The selection of an application must depend on the condition of the skin, at various stages, and the extent of the eruption. When the patches are dry, weak sulphur or resorcin ointments or pastes are suitable. Such applications are irritant when strong. Raw patches, without much oozing, can be dried up by a zinc ointment or paste. The following makes a very useful "whitewash," viz., Zinc oxide ʒiij, Lanolin ʒii, Lime water and Olive oil, of each ʒss. Free oozing, or an acute outburst, is best dealt with, by compresses of lead, or zinc, lotion, or equal parts of black wash and lime water with 5 grains of Tragacanth powder to the ounce. Chronic patches demand the addition of resolvents, carefully watched. Sometimes anti-pruritics are called for, such as alcoholic solution of coal-tar and carbolic acid, but they are apt to irritate. Carbolic acid may be absorbed from extensive raw surfaces. Lastly, it is imperative to secure sleep, in some cases, by the administration of hypnotics at night.

Sweat Eruptions, mostly miliaria, are not uncommon. The eruption is composed of miliary red follicular papules, somewhat resembling papular eczema, and occasionally capped with a little vesicle or pustule. It may be regional, or more or less generalised. Careful investigation should be made into the existence of any provocative constitutional state, or external conditions of over-heating. Locally, a bland astringent lotion or powder is called for.

Lichen urticatus (Strophulus).—This intractable and multi-form eruption is of great frequency in infants, and is especially accentuated in the summer months. In the daytime, the infant generally presents a number (few to copious) of small soft papules, pale or reddened, of the size of a large pin-head to a hemp-seed. Often, mixed with these, are indications of the primary red macule, the size of the little finger nail, which are ephemeral and leave the more enduring papules behind them. These hyperæmic macules are of an urticarial nature,

and often are more or less white and urticate, or, in intense cases, bullous about the hands and feet. The mother will say that, in the evening, the child is "smothered" with these elementary red and white blotches, perhaps after a bath. Another less common, but interesting phase, is the centring of these red macules by a vesicle instead of a papule, and then the eruption is frequently mistaken for a time for varicella. These vesicles may become puriform, and as the itching is intense, secondary inoculations of pustules and ecthyma may occur. This eruption is most frequently mistaken for scabies, but, as a rule, the other children are unaffected, certainly not the adults, and there are no cuniculi and acari present.

The causes of this eruption are to be sought for in those mentioned under eczema, and the constitutional treatment, as regards diet, hygiene, and medicine, is on similar lines. Special attention should be given that the clothing, day and night, is not too heating. Anything that excites the circulation, such as warm baths, provokes the evolution of the eruption. Mr. Hutchinson insists on the prominent part, played by insects, in the causation of this eruption. Locally anti-pruritic applications are useful, *e.g.*, Liq. Carbonis detergentis, ℥ijss., Liq. Plumbi diacetatis, ℥ss. Add a teaspoonful to a pint of tepid water, and dab on freely. Sometimes a protective application, such as the zinc cream, already mentioned, is useful. Hypnotics are called for at night in severe cases.

Prurigo of Hebra is said to commence most frequently at a tender age, and by an urticaria-like eruption. The diagnosis from Lichen urticatus may therefore prove very difficult at this age. In older children, prurigo is characterised from the start by its distinctive papule, although certain lesions may become urticate.

Bromide Eruptions arise directly from medicine given to the infant, or from the ingestion of milk from a mother, who is taking bromide of potassium. These papulo-pustular eruptions, tending to form conglomerate and later vegetating clusters, are very characteristic.

In *Vaccination Eruptions*, it is important to distinguish two categories of trouble: the one in great measure beyond our control, the other preventable. To the first group belong

(1) abnormalities in the effects of carefully conducted vaccine inoculation, including more or less diffuse local erythema ; (2) eruptions, such as erythematous rashes, or urticaria, and, rarely, a generalised outbreak of vaccine lesions, all symptomatic of systemic implication, generally benign. In the secondary category, we place (1) inoculation of impure lymph, which is almost impossible in these days ; (2) the fouling of the wounds by various secondary contaminations, such as dirty dressings, scratching, &c., which may lead, on the one hand, to local ulceration, and gangrene, and tuberculosis, or the auto-inoculation of impetigo, ecthyma, or the vaccine lesions themselves ; and, on the other hand, to grave systemic infections, such as erysipelas, tetanus, septicæmia, and pyæmia.

A fourth group of eruptions is of external origin, and in great measure preventable.

Few infants escape having *intertrigo*, a simple diffuse inflammation localised to the folds of the body, due to traumatism of two rubbing secreting surfaces, though micro-organisms, probably grow. In slight cases, cleanliness and protection of the rubbing parts by powder, or other dressing, usually suffices. Unless attended to, ulceration and gangrene may supervene.

Scabies is apt to assume the appearance of generalised papulo-vesicular eczema, but it does not descend from the head, which remains nearly free. Cuniculi will be detected on the hands and feet, and the malady has probably been derived from the mother. *Styrax* ointment is indicated in bad cases. *Tinea circinata* may be met with, and its origin often baffles the enquirer. *Molluscum contagiosum* is another contagious and characteristic eruption, from its pearly-looking umbilicated growths. Other members of the family are generally affected.

Lastly, we come to an important group of eruptions, caused by the growth in the skin of microbes. Nurslings are very susceptible to cutaneous infections. An important point to remember is, that these infections may start in various traumatisms of the skin, or be inoculated from the nose, mouth, ears, and genitals. Formerly infections by way of the umbilicus were common. The streptococcus is probably responsible for the diffuse excoriations, behind the ears and in the mouth

commissures, often covered with a diphtheroid film, and for a curious vacciniiform eruption of the perianal, genital, and inguino-femoral regions, and for ecthyma. But the most important eruption is the so-called *Pemphigus neonatorum*. Sporadic cases occur, and occasionally epidemics. Formerly the latter were not uncommon in institutions. The mother or nurse may be affected. The eruption is characterised by the successive evolution, regional, or more or less, generalised, of superficial phlyctenæ, with a red areola. They break readily, leaving excoriations. Thus, by their excentric spread and confluence, extensive raw areas are produced of grave import. Its contagiousness demands a searching enquiry into any possible source, in the mucous orifices of the infant, its clothing, the genitals of the mother, the hands of the attendant. Systematic repeated cleansing of the skin is the important indication. Boric acid baths are useful. Afterwards a simple dressing, such as weak boric acid ointment, or zinc ointment, with a little ammoniated mercury, may be applied, or the zinc whitewash already mentioned.

Some infections may end in ulceration or gangrene. This may occur in vaccination wounds, in varicella lesions secondarily infected (varicella gangrenosa), in ecthyma, &c. The subjects are often debilitated or tuberculous. The bacteriology of these *multiple infective disseminated gangrenes of the skin* is not fully worked out.

The golden staphylococcus is responsible for causing more or less numerous *abscesses* in the skin. The affection is benign at its onset, but it may lead to systemic infection, and rarely *vice versa*. Commonly, some vesico-pustules form, and a few small superficial abscesses. If the child is in good health, a prompt surgical interference will effect a cure. If neglected, the linen and nails get soiled by the spontaneous bursting of the abscesses, and abscesses may generalise in surprising numbers. Tuberculous and syphilitic gumma are rare in the first months of life. It is said that galactophoritis of the nurse may be a cause of abscesses. Surgical interference, and as complete a disinfection of the skin as possible, are called for.



PHARMACOPŒIA FOR INFANTS.

By O. F. F. GRÜNBAUM, M.D. (CAMB.), D.Sc. (LOND.), M.R.C.P.,

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THESE doses are calculated for an infant aged three months, weighing 13 pounds. Infants, under one month, should receive half the dose, and those of six months, double doses.

APPLICATIONES.

Applicatio Glycerini Borici.—Glycerin, 5 parts; Boric acid, 3 parts. Mix with the aid of heat.

Applicatio Boracis Cum Potassii Chlorato.—Chlorate of Potash, 12 gr.; Borax, 12 gr.; Gum Tragacanth, 4 gr.; Glycerine, 1 dr.; Chloroform water to 1 oz.

BALNEA.

Balneum Alkalinum.—Bicarbonate of Soda, 1 oz.; Water at 96° F., 5 gallons.

Balneum Calidum.—Water at 98° to 104° F.

Balneum Frigidum.—Water at 65° F. reduced to 50° F. or lower.

Balneum Furfuris.—Bran, 2 oz. for each gallon of water. The bran should be enclosed loosely in a bag.

Balneum Sinapis.—Mustard, $\frac{1}{2}$ oz. to each gallon of water at 98° to 106° F.

Balneum Sulphuratum.—Sulphurated Potash, 1 oz.; Hot water, 7 gallons.

Balneum Tepidum.—Water at 85° to 92° F.

EMULSIO.

Emulsio Iodoformi.—Iodoform, 1 pt.; Glycerine, 3 pt.

ENEMA.

Enema Nutriens.—Farinaceous Pancreatized Food, 4 drms. To be given at 90° F.

Enema Astringens.—Silver Nitrate, $\frac{1}{2}$ gr.; Water, 1 oz.

Enema Frigida.—Ice Cold Water, 1 oz.

Enema Olei.—Olive Oil, 1 oz.

Enema Sedans.—Chloral Hydrate, 3 grs.; Water, $\frac{1}{2}$ oz.

GUTTÆ.

Guttæ Atropinæ et Cocainæ.—Atropine Sulphate, 2 grs.; Cocaine Hydrochloride, 10 grs.; Distilled Water, 1 oz.

Guttæ Atropinæ Sulphatis.—Atropine Sulphate, 1 gr.; Distilled Water, 1 oz.

Guttæ Argenti Nitratis.—Silver Nitrate, 3 grs.; Water, 1 oz.

Guttæ Protargol.—Protargol, 40 grs.; Distilled Water, 1 oz.

Guttæ Cocainæ Hydrochloratis.—Cocaine Hydrochloride, 10 grs.; Distilled Water, 1 oz.

Guttæ Homatropinæ.—Homatropine Hydrobromide, 4 grs.; Distilled water, 1 oz.

INJECTIO.

Injectio Morphine Hypodermica Infantilis.—Morphine, $\frac{1}{800}$ gr. ; Water (recently boiled) to 5 minims.

Injectio Strychnine.—Strychnine Hydrochloride, $\frac{1}{1000}$ gr. ; Water (recently boiled) to 5 minims.

LINCTUS.

Linctus Acidus.—Diluted Sulphuric Acid, 1 min. ; Spirit of Chloroform, 1 min. ; Oxyssel, 10 min. ; Treacle to 1 drin.

Linctus Infantilis.—Compound Tincture of Camphor, 1 min. ; Ipecacuanha Wine, 1 min. ; Glycerine, 10 min. ; Peppermint Water to 1 drin.

Linctus Pectoralis.—Oxyssel of Squill, 2 min. ; Ipecacuanha Wine, 1 min. ; Compound Tincture of Camphor, 1 min. ; Spirit of Nitrous Ether, 1 min. ; Water to 1 drin.

LINIMENTA.

Linimentum Acidi Borici c. Æthere.—Boric Acid, 10 gr. ; Methylated Ether, 1 drin. ; Methylated Spirit to 1 oz.

Linimentum Saponis.—Soft Soap, 1 drin. ; Water, 1 oz.

Linimentum Terebinthine Dilutum.—Turpentine Liniment, 1 pt. ; Olive Oil, 1 pt.

LOTIONES.

Lotio Acidi Borici.—Boric Acid, 15 gr. ; Water, 1 oz.

Lotio Acidi Carbolici.—Phenol, 8 gr. ; Water, 1 oz.

Lotio Acidi Carbolici c. Borace.—Glycerine of Carbolic Acid, 6 min. ; Glycerine of Borax, 6 min. ; Water to 1 oz.

Lotio Aluminis.—Alum, 4 gr. ; Water, 1 oz.

Lotio Ammonii Chloridi.—Ammonium Chloride, 15 gr. ; Methylated Spirit, 1 drin. ; Water to 1 oz.

Lotio Calamine.—Prepared Calamine, 30 gr. ; Zinc Oxide, 15 gr. ; Glycerine, 20 min. ; Solution of Lime, $1\frac{1}{2}$ oz. ; Water to 1 oz.

Lotio Carbonis Detergens.—Alcoholic Solution of Coal Tar, 12 min. ; Water to 1 oz.

Lotio Paraffini Composita.—Paraffin, 3 oz. ; Balsam of Peru, 2 drin. ; Oleate of Mercury, 1 drin. ; Olive Oil, 1 oz. To be applied with a stiff brush.

Lotio Plumbi.—Solution of Lead Subacetate, 6 min. ; Water to 1 oz.

Lotio Plumbi c. Opio.—Tincture of Opium, 30 min. ; Lead Lotion to 1 oz.

Lotio Potassii Chloratis c. Borace.—Potassium Chlorate, 6 gr. ; Borax, 6 gr. ; Water to 1 oz.

Lotio Sodii Biboratis.—Sodium Biborate, 15 gr. ; Sodium Bicarbonate, 15 gr. ; Glycerine of Carbolic Acid, 15 min. ; Water to 1 oz. To be used with an equal quantity of warm water.

Lotio Zinci Chloridi.—Chloride of Zinc, 1 gr. ; Water, 1 oz.

Lotio Zinci Sulphatis.—Zinc Sulphate, 2 gr. ; Fuchsin, q.s. ; Water, 1 oz.

MISTURÆ.

Mistura Acida cum Strychnina.—Solution of Strychnine Hydrochloride, $\frac{1}{8}$ min. ; Diluted Nitric Acid, $\frac{1}{2}$ min. ; Infusion of Calumba to 1 drin.

Mistura Acidi Hydrochlorici.—Diluted Hydrochloric Acid, $\frac{1}{2}$ min. ; Syrup, 5 min. ; Water to 1 drin.

Mistura Acidi Nitrohydrochlorici.—Dilute Nitrohydrochloric Acid, $\frac{1}{2}$ min. ; Spirit of Chloroform, $\frac{1}{2}$ min. ; Tincture of Orange Peel, 1 min. ; Water to 1 drin.

Mistura Acidi Sulphurici c. Opio.—Aromatic Sulphuric Acid, $\frac{1}{2}$ min.; Tincture of Opium, $\frac{1}{2}$ min.; Glycerine, 10 min.; Water to 1 drm.

Mistura Ætheris cum Ammonia.—Spirit of Æther, 1 min.; Aromatic Spirit of Ammonia, 1 min.; Tincture of Orange Peel, 1 min.; Camphor Water to 1 drm.

Mistura Alba.—Magnesium Sulphate, 2 gr.; Magnesium Carbonate, 1 gr.; Peppermint Water, 1 drm.

Mistura Aloes c. Ferro.—Tartrated Iron, $\frac{1}{2}$ gr.; Compound Decoction of Aloes, 5 min.; Water to 1 drm.

Mistura Aluminis.—Alum, 1 gr.; Syrup of Red Poppy, 10 min.; Water to 1 drm.

Mistura Ammoniae c. Ipecacuanha.—Ammonium Carbonate, $\frac{1}{2}$ gr.; Ipecacuanha Wine, 1 min.; Syrup, 10 min.; Water to 1 drm.

Mistura Ammonii Acetatis.—Solution of Ammonium Acetate, 5 min.; Potassium Citrate, 3 gr.; Glycerine, 5 min.; Distilled Water to 1 drm.

Mistura Ammonii Bromidi.—Ammonium Bromide, 1 gr.; Syrup of Orange, 5 min.; Water to 1 drm.

Mistura Ammonii Chloridi.—Ammonium Chloride, 1 gr.; Liquid extract of Liquorice, 2 min.; Water to 1 drm.

Mistura Ammonii Citratis.—Solution of Ammonium Citrate, 4 min.; Water to 1 drm.

Mistura Antiseptica.—Solution of Mercuric Chloride $\frac{1}{2}$ min.; Castor Oil, 5 min.; Mucilage, 5 min.; Syrup, 10 min.; Water to 1 drm.

Mistura Aperiens.—Extract of Jalap, $\frac{1}{8}$ gr.; Syrup of Senna, 3 min.; Spirit of Chloroform, 1 min.; Tincture of Ginger, 1 min.; Syrup, 10 min.; Caraway water to 1 drm.

Mistura Aromatica.—Aromatic Powder of Chalk, 2 gr.; Mucilage of Gum Acacia, 20 min.; Water to 1 drm.

Mistura Aromatica c. Rheo.—Magnesium Carbonate, 1 gr.; Aromatic Powder of Chalk, 3 gr.; Tincture of Rhubarb, 1 min.; Peppermint Water to 1 drm.

Mistura Astringens.—Extract of Logwood, 1 gr.; Ipecacuanha Wine, 1 min.; Tincture of Opium, min.; Chalk Mixture to 1 drm.

Mistura Belladonnæ Composita.—Tincture of Belladonna, 2 min.; Sodium Bicarbonate, 1 gr.; Syrup, 15 min.; Water to 1 drm.

Mistura Belladonnæ c. Potassii Bromido.—Potassium Bromide, 1 gr.; Tincture of Belladonna, 2 min.; Glycerine, 10 min.; Water to 1 drm.

Mistura Bismuthi Astringens.—Bismuth Oxycarbonate, 1 gr.; Aromatic Powder of Chalk with Opium, $\frac{1}{2}$ gr.; Glycerine of Tannic Acid, 1 min.; Mucilage to 1 drm.

Mistura Bismuthi Composita.—Bismuth Oxynitrate, 2 gr.; Sodium Bicarbonate, 1 gr.; Compound Tragacanth Powder, 1 gr.; Spirit of Chloroform, 1 min.; Caraway Water to 1 drm.

Mistura Bismuthi c. Catechu.—Bismuth Oxynitrate, 2 gr.; Solution of Potash, 1 min.; Tincture of Catechu, 1 min.; Compound Tincture of Cardamoms, 4 min.; Spirit of Chloroform, 1 min.; Mucilage of Tragacanth, q.s.; Water to 1 drm.

Mistura Bismuthi et Sodii.—Bismuth Oxycarbonate, 2 gr.; Sodium Bicarbonate, 2 gr.; Compound Powder of Tragacanth, 1 gr.; Dill Water to 1 drm.

Mistura Calcii Lactatis.—Calcium Lactate, 3 gr.; Dill Water to 1 drm.

Mistura Carminitiva.—Sodium Bicarbonate, 1 gr.; Aromatic Spirit of Ammonia, $\frac{1}{2}$ min.; Glycerine, 4 min.; Peppermint Water to 1 drm.

Mistura Carminitiva c. Hyoscyamo.—Sodium Bicarbonate, 1 gr.; Compound Tincture of Cardamoms, 3 min.; Tincture of Hyoscyamus, 1 min.; Dill Water to 1 drm.

Mistura Cascaræ Sagradæ.—Liquid Extract of Cascara Sagrada, 2 min.; Syrup of Ginger, 1 min.; Dill Water to 1 drm.

Mistura Cascaræ Sagradæ c. Stillingia.—Liquid Extract of Cascara Sagrada, 1 min.; Liquid Extract of Stillingia, 5 min.; Dill Water to 1 drm.

Mistura Catechu et Cretæ.—Tincture of Catechu, 2 min.; Aromatic Spirit of Ammonia, 1 min.; Spirit of Chloroform, 1 min.; Chalk Mixture to 1 drm.

Mistura Chloral Infantum.—Chloral Hydrate, 1 gr.; Potassium Bromide, 1 gr.; Syrup of Orange, 10 min.; Water to 1 drm.

Mistura Chloral Hydratis c. Belladonna.—Chloral Hydrate, 1 gr.; Tincture of Belladonna, 1 min.; Glycerine, 10 min.; Water to 1 drm.

Mistura Cinchonæ.—Compound Tincture of Cinchona, 6 min.; Syrup, 5 min.; Water to 1 drm.

Mistura Cretæ Astringens.—Aromatic Powder of Chalk, 2 gr.; Compound Tincture of Camphor, 2 min.; Tincture of Catechu, 2 min.; Chalk Mixture, 20 min.; Water to 1 drm.

Mistura Cretæ c. Hæmatoxylo.—Chalk Mixture, $\frac{1}{2}$ drm.; Tincture of Catechu, 1 min.; Decoction of Logwood to 1 drm.

Mistura Ferri Hypophosphitis.—Compound Solution of Ferrous Hypophosphite, 5 min.; Syrup, 10 min.; Water to 1 drm.

Mistura Ferri Infantibus.—Solution of Dialysed Iron, 3 min.; Syrup, 10 min.; Water to 1 drm.

Mistura Ferri Iodidi.—Potassium Iodide, $\frac{1}{2}$ gr.; Iron and Ammonium Citrate, $\frac{1}{2}$ gr.; Syrup, 10 min.; Water to 1 drm.

Mistura Ferri Laxans.—Magnesium Sulphate, 1 gr.; Dilute Sulphuric Acid, $\frac{1}{2}$ min.; Ferrous Sulphate, $\frac{1}{10}$ gr.; Syrup, 10 min.; Peppermint Water to 1 drm.

Mistura Ferri Phosphatis.—Parrish's Syrup, 10 min.; Water to 1 drm.

Mistura Gentianæ Alkalina.—Sodium Bicarbonate, 1 gr.; Compound Infusion of Gentian, $\frac{1}{2}$ drm.; Water to 1 drm.

Mistura Gentianæ c. Rheo.—Sodium Bicarbonate, $\frac{1}{2}$ gr.; Compound Tincture of Gentian, 1 min.; Infusion of Rhubarb, 10 min.; Spirit of Chloroform, $\frac{1}{2}$ min.; Peppermint Water to 1 drm.

Mistura Gentianæ c. Senna.—Infusion of Senna, 10 min.; Compound Infusion of Gentian, 20 min.; Water to 1 drm.

Mistura Hæmatoxyli Composita.—Extract of Logwood, 1 gr.; Ipecacuanha Wine, 1 min.; Tincture of Opium, $\frac{1}{2}$ min.; Chalk Mixture to 1 drm.

Mistura Hydrargyri Perchloridi.—Solution of Mercuric Chloride, 2 min.; Distilled Water, 1 drm.

Mistura Iodi Composita.—Glycerine of Phenol, $\frac{1}{2}$ min.; Tincture of Iodine, $\frac{1}{2}$ min.; Caraway Water to 1 drm.

Mistura Ipecacuanhæ.—Ipecacuanha Wine, 1 min.; Glycerine, 10 min.; Water to 1 drm.

Mistura Ipecacuanhæ Ammoniatæ et Belladonnæ.—Tincture of Belladonna, 1 min.; Tincture of Squill, 1 min.; Ammonium Carbonate, $\frac{1}{2}$ gr.; Ipecacuanha Wine, 1 min.; Water to 1 drm.

Mistura Ipecacuanhæ c. Ammonia.—Ammonium Carbonate, $\frac{1}{2}$ gr.; Potassium Bicarbonate, $\frac{1}{2}$ gr.; Ipecacuanha Wine, 1 min.; Syrup of Balsam of Tolu, 5 min.; Caraway Water to 1 drm.

Mistura Naphthalini.—Pure Naphthalin, $\frac{1}{2}$ gr.; Syrup, 10 min.; Mucilage of Tragacanth, q.s.; Caraway Water to 1 drm.

Mistura Olei Morrhuæ.—Cod Liver Oil, Glycerine, Solution of Lime, of each equal parts.

Mistura Olei Morrhuæ c. Ferro.—Cod Liver Oil, 20 min.; Gum Acacia, 2 gr.; Tartrated Iron, gr.; Treacle, 20 min.; Cassia Water to 1 drm.

Mistura Olei Ricini.—Castor Oil, 5 min.; Mucilage of Gum Acacia, 10 min.; Peppermint Water to 1 drm.

Mistura Olei Ricini c. Opio.—Tincture of Opium, $\frac{1}{2}$ min.; Ipecacuanha Wine, 1 min.; Castor Oil Mixture to 1 drm.

Mistura Potassii Bromidi.—Potassium Bromide, 1 gr.; Syrup of Orange, 10 min.; Water to 1 drm.

Mistura Potassii Bromidi et Chloral Hydratis.—Potassium Bromide, $\frac{1}{2}$ gr.; Chloral Hydrate, $\frac{1}{2}$ gr.; Syrup, 10 min.; Water to 1 drm.

Mistura Potassii Citratis.—Potassium Citrate, 2 gr.; Water to 1 drm.

Mistura Potassii Iodidi.—Potassium Iodide, $\frac{1}{2}$ gr.; Aromatic Spirit of Ammonia, 1 min.; Water to 1 drm.

Mistura Quininae.—Quinine Sulphate, $\frac{1}{2}$ gr.; Dilute Sulphuric Acid, $\frac{1}{2}$ min.; Syrup, 10 min.; Water to 1 drm.

Mistura Quininae c. Ferro.—Quinine Sulphate, $\frac{1}{2}$ gr.; Solution of Ferric Chloride, $\frac{1}{2}$ min.; Glycerine, 5 min.; Water to 1 drm.

Mistura Rhei c. Soda.—Powdered Rhubarb, $\frac{1}{2}$ gr.; Bicarbonate of Soda, $\frac{1}{2}$ gr.; Syrup of Ginger, 2 min.; Water to 1 drm.

Mistura Salina.—Solution of Ammonium Acetate, 15 min.; Potassium Citrate, 1 gr.; Camphor Water to 1 drm.

Mistura Salina Aperiens.—Magnesium Sulphate, 3 gr.; Acid Infusion of Roses to 1 drm.

Mistura Scillæ Composita.—Oxymel of Squill, 2 min.; Compound Tincture of Camphor, 1 min.; Spirit of Nitrous Ether, $\frac{1}{2}$ min.; Water to 1 drm.

Mistura Scoparii Composita.—Potassium Acetate, 1 gr.; Spirit of Nitrous Ether, 1 min.; Solution of Ammonium Acetate, 5 min.; Vinegar of Squill, 1 min.; Decoction of Broom to 1 drm.

Mistura Senegæ Composita.—Ammonium Chloride, $\frac{1}{2}$ gr.; Ammonium Carbonate, $\frac{1}{2}$ gr.; Syrup of Balsam of Tolu, 7 min.; Ipecacuanha Wine, 1 min.; Infusion of Senega to 1 drm.

Mistura Sodii Citratis.—Sodium Citrate, 4 gr.; Chloroform Water, 1 drm.

Mistura Sodii et Calcis.—Sodium Bicarbonate, 2 gr.; Saccharated Solution of Lime, 5 min.; Dill Water to 1 drm.

Mistura Sodii Sulphatis c. Cascara.—Sodium Sulphate, 1 gr.; Liquid Extract of Cascara Sagrada, 1 min.; Glycerine, 5 min.; Cinnamon Water to 1 drm.

PULVERES.

Pulvis Alterativus.—Sodium Bicarbonate, 1 gr.; Rhubarb, $\frac{1}{2}$ gr.; Mercury with Chalk, $\frac{1}{2}$ gr.

Pulvis Bismuthi Astringens.—Bismuth Oxynitrate, 1 gr.; Tannic Acid, 1 gr.; Aromatic Powder of Chalk, $\frac{1}{2}$ gr.

Pulvis Bismuthi Comp.—Magnesium Carbonate, $\frac{1}{2}$ gr. ; Bismuth Oxynitrate, 1 gr. ; Aromatic Powder of Chalk, $\frac{1}{2}$ gr.

Pulvis Bismuthi c. Opio.—Bismuth Oxynitrate, 6 gr. ; Aromatic Powder of Chalk with Opium, $\frac{1}{2}$ gr.

Pulvis Calcii Sulphidi.—Sulphurated Lime, $\frac{1}{10}$ gr. ; Milk Sugar, 1 gr.

Pulvis Catharticus.—Compound Powder of Jalap, 1 gr. ; Mercurous Chloride, $\frac{1}{2}$ gr. ; Ginger, $\frac{1}{2}$ gr.

Pulvis Consersus Acidi Borici et Amyli.—Boric Acid, 1 pt. ; Starch Powder, 2 pt.

Pulvis Consersus Zinci Oxidi.—Zinc Oxide, 1 pt. ; Starch Powder, 3 pt.

Pulvis Consersus c. Hydrargyro.—Zinc Oxide, Boric Acid, Starch and Mercurous Chloride in equal parts.

Pulvis Hydrargyri Aromaticus.—Mercury with Chalk, $\frac{1}{2}$ gr. ; Aromatic Powder of Chalk, $\frac{1}{2}$ gr.

Pulvis Sodii Phosphatis.—Phosphate of Soda, 3 gr.

Pulvis Thyroideæ.—Powdered Thyroid Gland, $\frac{1}{2}$ gr.

UNGUENTA.

Unguentum Acidi Carbolici et Sulphuris.—Liquefied Phenol, 2 drm. ; Mercuric Nitrate Ointment, 2 drm. ; Sulphur Ointment, $\frac{1}{2}$ oz.

Unguentum Acidi Salicylici c. Bismutho.—Salicylic Acid, 15 grs. ; Bismuth Oxycarbonate, 1 drm. ; Starch, 1 drm. ; Zinc Ointment to 1 oz.

Unguentum Flavum Dilutum.—Yellow Mercuric Oxide, 4 gr. ; Vaseline, 1 oz.

Unguentum Hydrargyri Ammoniaci Dilutum.—Ammoniated Mercury, 5 gr. ; Yellow Wax, $\frac{1}{2}$ oz. ; Olive Oil, $\frac{1}{2}$ oz. ; Lard to 1 oz.

Unguentum Hydrargyri Nitratus Mitius.—Mercuric Nitrate Ointment, 1 drm. ; Vaseline, 7 drm.

Unguentum Hydrargyri Oxidi Flavi.—Yellow Mercuric Oxide, 8 gr. ; Soft Paraffin, 1 oz.

Unguentum Hydrargyri Oxidi Rubri Dilutum.—Red Mercuric Oxide, 30 gr. ; Soft Paraffin, 1 oz.

Unguentum Hydrargyri Subchloridi c. Zinco.—Anhydrous Lanolin, 1 drm. ; Sweet Almond Oil, $\frac{1}{2}$ oz. ; Dissolve ; Zinc Oxide, $\frac{1}{2}$ oz. ; Calomel, $\frac{1}{2}$ drm. Mix and then add Solution of Lime, 3 drm.

Unguentum Plumbi Oleatis.—Lead Oleate, 1 oz. ; Soft Paraffin, 1 oz.

Unguentum Simplex.—Yellow Wax, $\frac{1}{2}$ oz. ; Olive Oil, $\frac{1}{2}$ oz. ; Lard, $\frac{1}{2}$ oz.

Unguentum Sulphuris Compositum.—Sulphur, $\frac{3}{4}$ oz. ; Ammoniated Mercury, 12 gr. ; Mercuric Sulphide, 12 gr. ; Olive Oil, $1\frac{1}{2}$ drm. ; Creosote, 1 min. ; Lard, $\frac{1}{2}$ oz.

Unguentum Zinci Oleatis.—Zinc Oxide, 1 drm. ; Oleic Acid to 1 oz. Stir well together, and let stand for two hours ; then heat sufficiently to complete solution. To be used with equal part of Vaseline.



NOTES ON SOME OF THE BEST BOOKS ON THE DISEASES OF CHILDREN.

THE following list is by no means exhaustive, but it contains references to those which will be found useful to the general practitioner :—

ASHBY AND WRIGHT.—*Diseases of Children* (Longmans, Green & Co., Paternoster Row, E.C. 25s.). This book deals with both the medical and surgical side of the subject, and is one of the best text books on the subject extant. A new edition has just been published.

BALLANTYNE.—*Antenatal Pathology and Hygiene* (W. Green, Edinburgh. 21s.), contains a vast amount of information on congenital deformities and diseases.

CAUTLEY.—*Feeding of Infants* (J. and A. Churchill, 7, Great Marlborough Street, W. 7s. 6d.), and

CHEADLE.—*Artificial Feeding and Food Disorders of Infants* (Smith, Elder & Co., Waterloo Place, S.W. 5s.) are the most important books on the subjects of which they treat.

ELDER AND FOWLER have written a little handbook on *The Diseases of Children* (Griffin & Co., Ltd., Exeter Street, Strand. 10s. 6d. net), which embodies in a small compass a very considerable amount of useful information.

GOODHART AND STILL.—*Diseases of Children*. Eighth edition (J. and A. Churchill, 7, Great Marlborough Street, W. 12s. 6d.). That eight editions of this valuable and useful work should have been called for speaks volumes for its popularity. It deals with all diseases to which young children are liable, and is one of the best and most complete works on the subject. The appendices are especially valuable, containing, as they do, 54 formulæ, a number of useful recipes and directions to mothers in dealing with children who are the victims of infantile paralysis. An excellent and very helpful index is added.

HENOCH, E.—*Lectures on Children's Diseases* (New Sydenham Society, 136, Gower Street, W.C.). These lectures have been translated by Dr. J. Thomson, of Edinburgh, and are a mine of clinical experience.

HOLT.—*Diseases of Infancy and Childhood* (Sidney Appleton, 25, Bedford Street, Covent Garden. 25s. net) is one of the most complete practical text-books on the subject, and is a most trustworthy book. It is an American work and naturally emphasises the value of American treatment, which is not only interesting but instructive. The book is especially valuable on account of the accuracy with which it is compiled, and the careful deductions which have been drawn from the statistics gathered.

HUTCHINSON, R.—*Lectures on Diseases of Children* (E. Arnold, Maddox Street, W. 8s. 6d. net.) is a very useful elementary work on the subject, and contains some excellent illustrations.

IRELAND, W. W.—*Mental Affections of Children*. Second edition (J. and A. Churchill, 7, Great Marlborough Street, W. 14s.). This is a most interesting work, and is really the standard upon the subject.

ROTCH, THOMAS MORGAN.—*Pediatrics ; The Hygienic and Medical Treatment of Children* (I. B. Lippincott Co., Henrietta Street, W.C. 25s.). The last edition of this work, which was re-arranged and re-written and therefore offered to the profession practically as a new book, appeared in 1903. It contains an exhaustive account of the physiology of the young child, and an exceedingly good chapter upon the feeding of infants. It is one of the most complete and most practical books upon the subject in the English language, and one, therefore, which may safely be recommended to the general practitioner. The work is fully illustrated by some excellent figures, coloured plates, and radiographs.

SHUTTLEWORTH on *Mentally Deficient Children* (H. K. Lewis, 130, Gower Street, W.C. 5s. net) is a short but very practical work.

SMITH, EUSTACE.—*Wasting Diseases of Children* (J. and A. Churchill, 7, Great Marlborough Street, W. 22s.) is a very

excellent work and full of practical suggestions. His *Text Book on Disease in Children* (J. and A. Churchill, 7, Great Marlborough Street, W. 6s.) is so full of accurate clinical information that it is to be regretted that there has not been issued a new edition for some years.

TAYLOR, JAMES.—*Paralysis and other Diseases of the Nervous System in Childhood and Early Life* (J. and A. Churchill, 7, Great Marlborough Street, W. 12s. 6d. net). Although this work does not deal exclusively with children, it is none the less a most useful and trustworthy work.

TUBBY, A. H.—Mr. Tubby's work on *Orthopædic Surgery* (Macmillan & Co., St. Martin's Street, W.C. 17s.), was published in 1896. It is one of the best books on the subject in the English language, is well written, and profusely illustrated with accurate and instructive figures. All the important deformities and diseases included under Orthopædic Surgery are fully treated and discussed. There is an excellent index to the volume.

WEST, CHARLES.—*Lectures on the Diseases of Infancy and Childhood* (Longmans, Green & Co., Paternoster Row, E.C.). Though this work is, comparatively speaking, an old one, it is of considerable value to-day.

WORTH, CLAUD.—*Squint; its Causes, Pathology, and Treatment* (Bale, Sons & Danielsson, Great Titchfield Street, W. 6s. net). A second edition of this very useful work has just been published. It can safely be recommended to all general practitioners, for cases of squint are certain to come before their notice. Numerous cases are referred to by way of illustration. The printing is decidedly good and the price moderate.



Notes by the Way.

A Vanishing Race.

THE terrible waste of infant life, has, of course, long been known to medical practitioners, but it is only recently that any serious anxiety on the subject has been aroused in the public mind. But a few years ago we were wont to hug with Pharisaic self-complacency the fond delusion that we were not even as those Frenchmen whom the supposed teachings of the Gospel according to Malthus were leading slowly but surely to national destruction. The abounding fertility of our race was our constant boast, and in expansive moments we gave utterance to the belief that the mission given us by providence was to people the earth and enjoy the fulness thereof. From this vainglorious dream we have been rudely awakened by the cry of alarm raised by students of vital statistics. It has been discovered that our birth rate is seriously and steadily declining. It is true that there has also within the last half century been a great decline in the general death rate; it is obvious, however, that, while the latter process cannot continue indefinitely, there is practically no limit to the possible decrease of population. And what makes the prospect from an imperial point of view still more gloomy is that in Australasia the decline of the birth rate is at least as rapid as in the Mother Country. In America the fall in the birth rate has of late years become so great that statesmen are beginning to fear that the Anglo-Saxon element, which is the backbone of the United States, will ultimately disappear. We are, therefore, face to face with the question. Is our race beginning to vanish?

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Infant Mortality.

THE outlook is made more serious by the fact that while the general death rate has decreased there has been no corresponding reduction in infant mortality. As Dr. Newsholme shows in his valuable statistical study published in this number of *THE PRACTITIONER*, the infantile mortality of the country as a whole is stationary. This means that the infant population has not shared in the general improvement at other ages. But

poor comfort is to be found in the fact that many other countries, including Germany, Austria, Italy, and Spain, are considerably worse in this respect, while France, Switzerland, Belgium, and Holland are as bad.

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The Slaughter of the Innocents. THE chief cause of infant mortality is not to be found in frailty of constitution. The plain truth is that the great majority of infants are killed by wrong feeding. Artificial foods of one kind or another have largely taken the place of the mother's milk, which is the natural nourishment of the infant. Many of these are prepared according to the strictest scientific principles, but, as Dr. Handfield-Jones happily puts it, "the infant stomach rises superior to chemical formulæ." The selfishness of women of the upper classes, and the stress of the struggle for existence among those of the lower, have, however, made the use of substitutes for mother's milk, to a huge extent, a necessary evil. Valuable information as to these will be found in this issue, contributed by Drs. Handfield-Jones, Still, Cautley, Sutherland, and Burnet, who speak out of the abundance of a ripe experience. The action of philanthropic organisation in France and of certain municipal bodies in England to cope with the evils of improper feeding of infants is described by Drs. L. Robinson, of Paris, and McCleary, the well-known M.O.H. of Battersea. Other aspects of the problem of infant mortality are ably dealt with by Drs. John Thomson, J. W. Ballantyne, Major Greenwood, W. S. Colman, Leonard Guthrie, and Colcott Fox, and the whole number will, it is hoped, be found a help to the general practitioner in his daily struggle to prevent the slaughter of the innocents, and a contribution of solid value to the solution of the problem of pressing importance to the stability of our Empire and the future of our race.

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The Decadence of the Briton. THE mind's ear at the present day is deafened by the clamour of philanthropists and reformers, each anxious to "go one better" than his rivals by calling attention to a new evil threatening the existence of society. The degeneracy of the race, the increase of insanity, the general prevalence of neurosis, the growth of luxury, the sacrifice of duty to pleasure

—all this and much more is dinned into us with “damnable iteration” day by day by preachers, lecturers, platform orators, and leader writers, till nervous persons might be forgiven for thinking that the British Empire and all which it inherit were fast fading away like Prospero’s unsubstantial vision and would leave not a wrack behind. To the student of human evolution the outcry sounds exaggerated and even a trifle absurd. Our social system is certainly not all that it should be; but when has human society been perfect? In every age prophets have told the nations that they were falling into decay. The golden age is a dream; so, too, we fear, is the perfectibility of the human race. Mrs. Gamp was not a philosopher, but her remark that “we live in a wale” embodies the concentrated essence of all philosophies. We can improve the conditions under which we live, but we cannot, take what thought we may, change our “wale” into a Garden of Eden. The evils that are now so fervidly denounced have always existed and will continue to exist, for the simple reason that they depend either on economic laws, which man cannot control, or on causes inherent in his own nature which he is powerless to alter. There is no proof that the physique of the race is deteriorating. The prevalence of nervous instability is the natural consequence of the extension of mental power: it is scarcely too much to say that in no sphere of human activity has anything really great been achieved except by persons whom a physician would call neurotic. “’Tis a mad world, my masters,” may be a statement saddening to Mr. Gradgrind, but when the world is no longer mad, it will be intellectually and morally dead. We do not wish to be understood as depreciating the efforts of those who are striving for the betterment of mankind; but we venture to think that they protest too much. Man seems to find a morbid pleasure in the thought that he is degenerating; he reverses the French proverb, and says the present is always wrong.

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Lunaey
Legislation.

THERE surely could not be a more striking illustration of the political powerlessness of the medical profession than the way the Government has played—there is really no other word for it—

with the Lunacy Bill. This measure, which is of urgent importance to the welfare of the community, has been for two or three years a shuttlecock between the Lord Chancellor and the County Council. A similar Bill has already twice passed the House of Lords. At a late period in the session the Bill was awaiting its second reading in the House of Commons, and on July 18th there appeared in the *Times* a letter signed by Sir William Church, Sir William Gowers, Dr. Savage, Dr. Ferrier, and Sir William Broadbent, making "an earnest appeal to the Prime Minister to afford the measure the small facilities which it needs that the Government and the House of Commons may not again be open to the charge of indifference to the urgent needs of this class of sufferers." What was the result? In the *Times* of the following day, it was announced that the Lunacy Bill was ordered to be withdrawn!

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**The Higher
Education of
Women.**

DR. HYSLOP has come in for a good deal of criticism in certain newspapers for having dared to say at the annual meeting of the British Medical Association that "the removal of woman from her natural sphere of domesticity to that of mental labour not only rendered her less fit to maintain the race, but her brain degenerated and initiated a downward tendency to her progeny. The transference of the female population from its proper rôle in Nature, as caused by the present artificial conditions of society and the exigencies of the age, were responsible for much of the physical deterioration, infantile mortality, and diminished virility of the race." The evil effects of the over-education of women are more manifest in the United States, where the movement began, than here, where it is more recent. Only the other day Dr. F. W. Van Dyke pointed out in the New York *Medical Record* the wisdom shown in the prevailing courses of instruction for young girls, who are required at a class to do work adapted only for those of special ability. An incalculable amount of nerve energy is dissipated in acquiring abstruse knowledge of no practical service. This cramming process, applied to mediocrity, is the most frequent cause of hysteria, neurasthenia, dyspepsia, astigmatism, and dysmenorrhœa. In addition to physical incapacity, there often ensues sexual

frigidity, leading to marital unhappiness. Pregnancy in such women is accompanied by many untoward symptoms, and uterine inertia, or a slight disproportion between the foetal head and the pelvic diameters of the mother, is usually present, and gives rise to more or less troublesome dystocia. Dr. Van Dyke admits that higher education is not without its value, and a woman with talent or genius should have it developed to the fullest extent, but the effort constantly being made to force an average ability to keep pace with well-defined talent is predestined to failure, and leads to deplorable results. From a material point of view, the most serious result of the mental strain caused by higher education in women is one to which he does not allude. The Anglo-Saxon element in the population of the United States is diminishing at a rate that is causing alarm to statesmen. The cause is simply that the highly-educated women either do not marry, or, if they succeed in finding husbands, the unions are barren or result in offspring so sickly and neurotic that they are a source of weakness rather than of strength to the nation. It is no answer to Dr. Hyslop to say that many of the women, who enter professions, are longing to be married but do not get the chance. It is not their fault that they are driven to educate themselves beyond their strength; nevertheless, the consequences are lamentable. Of course there are women in whom the development of the cerebral faculties is accomplished without injury to other parts of the organism. These however, are altogether exceptional cases; yet it is on the exceptions that the modern system of the higher education of women is built.

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THE result of the August competition is as follows:—**Competitions.** The best essay was sent by Dr. Dan McKenzie, of Leytonstone; and the best answers to questions by Dr. G. G. Davidson, of West Kensington. Cheques have accordingly been sent to these gentlemen.



COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the September Competitions will be announced in the November number.

a.—The Subject of the Essay for October will be

The Treatment of Locomotor Ataxia.

b.—Answers to the following questions are invited :—

1. What are the causes of Ozoena?
2. What are the causes of Ascites?

3. A male, aged 55, a clerk, was admitted into hospital, complaining of continuous occipital headache and pains in the legs. The family history given was that his father died of gout, and that two of his brothers suffered from gout. He had always had good health, but for the last twenty years had taken a good deal of alcohol. There was no history of syphilis. Two months before admission into the hospital, he began to suffer from headaches and lassitude, and was unable to attend to his work. The headaches persisted in spite of treatment. At this time, his eyesight began to fail, and he worried a good deal about himself. A month before admission, he had a fit, during which he bit his tongue. He was unconscious for about twenty minutes. On admission he was found to be well nourished, his face was red, and his facial muscles twitched. Tongue was dirty and breath offensive, no appetite. Temperature normal. Pulse regular, slow, tension high, artery thickened. Heart sounds normal. Lung sounds normal. Pupils unequal, but react to light, and to accommodation. Knee jerks slightly increased. Urine acid, sp. gr. 1012, a little albumen and a trace of sugar. The patient answered questions very slowly, speech was hesitating. During the first week in hospital, the patient improved, but later he began to vomit after his food, and at night became restless. Ten days after admission, he passed into a sub-conscious condition, the temperature became subnormal, the head was retracted and the abdomen sunken. In two days, the patient was quite quiet, having passed into a semi-comatose condition. He passed urine and faeces under him. This state lasted for three days when the respirations became irregular, the temperature dropped to 96°, and death ensued. What is the diagnosis of the case, and what was found on post-mortem examination?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of November, 1905. No Essay must contain more than three thousand words, and the Editor reserves the right to publish any Essay, which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of November, 1905.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.

(2) The name or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

THE PRACTITIONER.

NOVEMBER, 1905.

THE PRINCIPLES UNDERLYING THE TREATMENT OF BACTERIAL DISEASES BY THE INOCULATION OF CORRESPONDING VACCINES.

By WILLIAM BULLOCH, M.D.,

Bacteriologist to the London Hospital.

WHEN a pathogenic and parasitic microbe invades the body of man, complicated phenomena ensue, the whole process being conventionally looked upon in the nature of a conflict. On the one hand offensive weapons brought into action by the microbe enable it to pass a phase of its existence before it again makes its exit from the body. On the other hand the host, by various defensive mechanisms, seeks to protect its cellular units against the advancing microbe. From the character of the vital processes of both the invader and the invaded, one can easily comprehend that the phenomena of infection and immunity must be complex. We know, speaking generally, that microbes seek to protect themselves, during their sojourn in the body, by the elaboration of poisons. In certain cases, these poisons may be excreted (exotoxines) and pass in the circulating blood to the most remote regions of the body, while the microbe, which produced them, may remain limited to the point of inoculation. In other cases, and these are the more numerous, the poisons are closely associated with the microbic protoplasm (endotoxines) and are believed to be set free only after a dissolution of the microbe has taken place. These two classes of poison differ in their nature, the efforts of the host to combat the toxic effect of the endotoxines being less potent in comparison with that which obtains in the case of the exotoxines. Without, however, entering into the question of bacterial intoxication, we must pass to consider the defensive machinery elaborated by the host as a response to the infection. One cannot doubt that such machinery is set in motion, when one reflects that many

infections end in recovery. Without some form of resistance, the race of man, exposed as it is to multitudinous chances of infection, would be rapidly exterminated. The degree, however, to which this defence can be called upon is the subject of extraordinary variations in different infections. In some cases, it suffices, in other cases, it is totally inadequate, and the infected individual, beyond the range of therapeutic remedies, rapidly succumbs. From all we know of metabolism, the mechanism of defence probably consists in the production of protective substances which, entering the blood stream, are carried in this stream throughout the body. Where these substances are formed is not known with certainty, and the inquiry into this problem need not attract us afield at the present moment.

It suffices to know that these chemical protective substances can be demonstrated in the blood; and further, it cannot be doubted that they are created by the host. This was first clearly set forth by Ehrlich, who also developed the view—nowadays uncontested—that, before a bacterial intoxication can take place, the poison must enter into chemical union with some cellular element in the body. The cell, which becomes affected, varies in the different infections, but from the ability of the poison to turn towards some cell, Wright has proposed the general name of “tropines” for bodies of this class. Thus a poison like tetanus toxine, which enters into chemical union with nerve protoplasm, may be called “neurotropic.”

The act of union of the tropine with cellular protoplasm calls forth as a reply, on the part of the host, the development of substances directed against the deleterious tropines. In the widest sense of the word, such substances are protective, and may be conveniently described as “antitropic.” At the present day, several types of these antitropines are known, some capable of neutralising the effects of bacterial tropines, others acting as antidotes against tropines of highly organised plants or even those of animal origin, such as snake venom. From their remarkable properties, the study of these antitropines assumes immense importance from a practical point of view. The difficulties, however, in the nature of the subject are so great that, despite the labours of the

greatest medical researchers during the last twenty years, we must admit that what is known is a mere drop out of the ocean of the unknown.

We know, however, that the antitropines vary quantitatively and qualitatively. In certain diseases, they act in such a way that an immunity is produced for a long period or even for life. At other times, the quantities and qualities of the antitropines are of low degree, the immunity being absent, insufficient, or transient. Among the fundamental facts accepted in medicine at the present day, we know that immunity may be induced artificially, and, if this is done prior to the infection, the individual may escape wholly or entirely from a disease which might otherwise prove fatal. This prophylactic method, inaugurated by Edward Jenner and continued by Pasteur, Behring, Haffkine, and Wright, has been utilised on a large scale, and with signal success, in the prevention of variola, anthrax, rabies, diphtheria, cholera, and enteric fever.

Great as the prophylactic principle of inoculation is, it pales in importance before methods which can bring about a cure *after* an infection has taken place.

That such a thing is possible has been amply decided by the medical world in reference to the diphtheria antitoxin of Behring and Kitasato. Apart from their work, the most remarkable attempts at therapeutic inoculation are those initiated by Koch in the case of tubercle, and the recent work in this country by A. E. Wright. The principles laid down by the latter investigator seem destined to open up entirely new fields for the enterprising therapist in the treatment of diseases, against which he has hitherto been practically powerless.

The possibility of curing an infection by material obtained directly from the infecting virus is a remarkable fact, but none the less true, and here it must be remembered that the process of inoculating a vaccine into an individual already infected with a virus is, in its essence, fundamentally different from the treatment of diphtheria by antitoxin. Years ago Pasteur widened the concept of the term "vaccine" by applying it to material obtained from cultures, and capable of producing immunity. Wright has even gone further, and

defines a vaccine as "any chemical substance which, when introduced into the body, causes there an elaboration of protective substances." In any case the word "vaccine" has completely lost its etymological significance.

Origin of Antitropines.—It is apparently to the presence of antitropines in the normal blood that human beings owe their immunity to, and recovery from, infections. The manner in which these protective substances has arisen is not known. It is probable, however, that they subserve other functions in the body, and primarily arise independently of any bacterial infection. At the same time, repeated inoculations with small quantities of a virus lead to increased antitropic formation, and no doubt antitropines, or the ability to produce them, pass from ascendants to descendants. At any rate it is easy to prove the existence of protective substances in the circulating blood and lymph of perfectly healthy people. The possibility of demonstrating this in minute quantities of serum, we owe to A. E. Wright, who, by ingenious and accurate technical methods, has made this an easy task, even in the hands of a tyro.

Whatever be the source and mode of origin of antitropines, they suffer remarkable changes in quantity when an infection takes place, or when a vaccine is introduced into the body artificially. Based on isolated experiments of Brieger and Ehrlich, Salomonsen and Madsen, Morgenroth, Bulloch, Sachs, and others, Wright from numerous original investigations has determined that in all cases a definite course is pursued by these antitropines. This has been stated by him as the "law of the ebb, flow and reflow, and subsequent maintained high tide of immunity."

One of the most important clauses in this law is the ebb, or "negative phase," which ensues when a bacterium or its products invade the body. Here there is a diminution in the antitropic content of the blood serum, and this is not due, as was shown by Salomonsen and Madsen, to the neutralisation of the antitropines by the bacterial tropine, as the diminution may be enormously greater than can be accounted for in this way. We must rather suppose that there is a profound alteration in the mechanism by which the antitropines are produced. Where the dose of tropine is large, the secretion of antitropines may

be temporarily suspended, the antitropine already present in the blood passing out of the body by some channel—apparently not in the urine, or, what is more likely, it may rapidly be burned up. Wright has brought a considerable body of evidence to show that the negative phase is one of increased susceptibility to infection. It can easily be demonstrated that where similar doses of one and the same vaccine are given to different individuals very marked differences in the antitropic content ensue. In some cases the negative phase is slight, or it may be altogether elided (Leishman). An apparent elision may, however, be due to the fact that too great an interval of time is allowed to elapse between the different estimations of the antitropic content of the blood, as it frequently happens that there is an extraordinary rapid and abrupt fall in the antitropic content, which may recover itself again in the course of a few hours. In individuals already infected by a microbe, very minute doses of the homologous vaccine usually produce, at first at any rate, a very definite negative phase. From a practical standpoint, the study of the depth and duration of the curve of the negative phase is a matter of the greatest moment.

After a time the negative phase is succeeded by the positive one or "flow" in which there is an increase due to the entry of newly-formed antitropines into the blood, and, from the nature of these bodies, one must suppose that the individual's resistance to infection is increased.

In a shorter or longer time, the reflow sets in, the antitropic content diminishing to a certain extent, but still keeping above the level it had before the introduction of the vaccine—"maintained high tide."

These phases can be seen satisfactorily only where the determinations of the antitropic content are made at frequent intervals, and it must be remembered that variations in the different components of the immunity curve occur with reference to different subjects, doses, and vaccines. The most successful results of inoculation as a therapeutic remedy are achieved by closely following the development of the immunity curve, and this is all the more true where repeated doses of a vaccine require to be inoculated to achieve the desired end. The art of immunisation consists in developing the optimum conditions for maximal antitropic formation, and, unless accurate

information is obtained of the immunity curve, the aims of the inoculator are easily frustrated.

Nature of Antitropines.—It is now well known that there are different kinds of bacterial antitropines, *e.g.*, antitoxins, agglutinins, precipitins, lysins, opsonins. Antitoxins neutralise the poisonous effects of certain bacterial toxins, the best known being those of diphtheria, tetanus, and botulismus. When, however, we investigate the blood-fluids of animals inoculated with vaccines and bacterial products other than those mentioned, it is found impossible to demonstrate the existence of antitoxins, or, at any rate, the quantity of antitoxin is so slight that it eludes demonstration. On studying the experimental typhoid and cholera infections, R. Pfeiffer showed that the protective properties of the immune sera in these diseases are due to the presence of lysins, *i.e.*, substances which bring about a dissolution of the typhoid bacillus and the cholera vibrio, respectively. Experiments made in succeeding years have, however, shown that this doctrine of lysis is not of universal application. In many contemporary works on bacteriology, the existence of lysins in other diseases is assumed, but without any justification from actual experiment. The study of immunity against microbes like pneumococcus, staphylococcus, streptococcus, gonococcus, tubercle, has led to the greatest diversity of opinion, some claiming antitoxic properties, others lytic, others phagocytic properties for the different sera. Metchnikoff for years has waged war on all who do not accept his phagocytic theory of immunity. According to this view, the defence of the infected host is brought about by the digestive action of certain cells of the body—phagocytes. Originally limited in its application, the term “phagocyte” includes, at the present time, a number of cellular units differing widely from a histogenetic standpoint. As can be seen in all his writings, Metchnikoff attributes pre-potent powers to the phagocytes, which he regards as the main element concerned in the destruction of infecting bacteria. Where he has been compelled to admit that the humours of the body contain antitropines, he assumes that such bodies must have come from the interior of the phagocytes, where they exist as ferments or cytases. In the living intact blood, he does not admit the presence of anti-

tropines, apart from the phagocytes. On the other hand, many bacteriologists, while admitting the existence of what is called "phagocytosis," have looked upon the phenomenon as largely of the nature of a scavenging process, the phagocytes taking up the microbes which have already been killed, or injured, by some other means.

A very remarkable advance towards the definitive solution of this conflict has been made by Wright and Douglas (1903), who have conclusively shown that the blood-fluids perform a definite and independent rôle in connection with phagocytosis. By the simple expedient of testing, separately and in conjunction, the serum and the leucocytes, they have shown that substances—opsonins—exist in the serum, and their function is, in some way, to alter the microbe so that it may fall an easy prey to the leucocyte. If the leucocyte is suspended in a serum from which the opsonins have been removed, they are incapable of manifesting any phagocytic action. The existence of such substances had been suspected years ago by Denys and Leclef, and by Mennes, but the merit of their actual demonstration and the determination of their essential features belong entirely to Wright and Douglas, who have also shown their importance from a practical standpoint, as they have succeeded in elaborating methods by which it is possible to make quantitative determinations of the opsonic content of the serum.

Their method of demonstration is simple. Certain volumes of serum, washed leucocytes, and bacterial emulsion are mixed together, incubated at 37° C. for 15 minutes, and the mixture is then blown on a slide, a film is made, stained appropriately, and the number of bacteria ingested by a number of leucocytes is determined, and an average per leucocyte struck. Wright and Douglas showed, in their first communication, that the opsonin is destroyed by heating the serum to 60° for 15 minutes. The fundamental experiment that the opsonin acts on the microbe, and is not merely a stimulator of the leucocyte, is made in this way, that, in one set of experiments, *unheated* serum is digested with bacteria for 15 minutes, and the mixture is then heated to 60° for 15 minutes. In another experiment the heated serum is mixed with bacteria for the same time, and

the result is compared. Thus, to quote one of the original experiments of Wright and Douglas :—

A. *Heated* serum (3 vols.) + staphylococcus suspension (previously heated to 75° C. and cooled) 1 vol. : digested for 15 minutes at 37° C.

Four vols. of the above added to 3 vols. of white blood corpuscles. Phagocytic power (bacteria in 30 polynuclear white blood corpuscles counted and averaged) - - - - - 4·2

B. *Unheated* serum (3 vols.) + staphylococcus suspension (previously heated to 75° C. and cooled) 1 vol.; digested together for 15 minutes at 37° C., then heated for 10 minutes to 60° C. and cooled.

Four vols. of the above added to 3 vols. of white blood corpuscles. Phagocytic power (bacteria in 15 polynuclear white blood corpuscles counted and averaged) - - - - - 31·0

While confirming all the observations of Wright and Douglas, Bulloch and Atkin have made further contributions to the knowledge of opsonic action, and especially into the relative rôles played by the opsonin and the leucocyte. They have obtained results which confirm the suggestion of Wright, that the leucocyte is largely an indifferent factor, the variable in a series of bloods being the serum.

Thus, in the following experiment, the serum mixed with the leucocytes of a normal individual is compared with the sera and the leucocytes of three advanced cases of facial lupus, the test material being a suspension of tubercle bacilli :—

1. Serum of normal individual + T. B. suspension + leucocytes of normal individual = 5·7 T. B. per leucocyte.

2. Serum of normal individual + T. B. suspension + leucocytes of lupus patient = 5·4 T. B. per leucocyte.

3. Serum of normal individual + T. B. suspension + leucocytes of lupus patient = 5·2 T. B. per leucocyte.

4. Serum of normal individual + T. B. suspension + leucocytes of lupus patient = 5·3 T. B. per leucocyte.

5. Serum of lupus patient + T. B. suspension + leucocytes of normal individual = 2·5 T. B. per leucocyte.

6. Serum of lupus patient + T. B. suspension + leucocytes of normal individual = 2.4 T. B. per leucocyte.

7. Serum of lupus patient + T. B. suspension + leucocytes of normal individual = 3.2 T. B. per leucocyte.

Bulloch and Atkin have also shown that where serum is mixed with suspensions of bacteria the latter rapidly abstract the opsonin, and further that the opsonin is a body of relatively simple constitution. They believe also that the action of heat is to destroy it, and not merely to convert it into a non-opsonisable modification, or opsonoid. With the exception of the latter statement, Hektoen and Ruediger also confirm the results of Wright and Douglas. It may be remarked, however, that their supposed demonstration of an opsonoid does not follow from their experiments. Without referring to the work of Wright and Douglas, Neufeld and Rimpau announce, as a new discovery, a third variety of specific serum requiring a direct cellular intervention to complete the bactericidal effect. Their results, with one exception, confirm the observations of Wright and Douglas, although their technical methods are much less perfect. Contrary to Wright, Bulloch, and others they find that the opsonic substance in the serum is not destroyed at a temperature of 60° C. and from this fact they argue that the opsonin comes into the category of an amboceptor which they think is complemented in the body of the leucocyte. They could not demonstrate that the serum had any stimulating effect on the leucocyte, as maintained by Metchnikoff, and in this they are in agreement with Wright.

Relation of Opsonin to Leucocytosis.—Clinical hæmatology is replete with observations which go to show that a leucocytosis is of almost universal occurrence in the course of infections. From this it might be thought that some relationship existed between the quantity and quality of the leucocytosis and the opsonic content of the serum. Bulloch and Ledingham have made a large number of experiments in this connection and have failed to demonstrate any constant relationship between these events. With certain drugs, such as sodium cinnamylidum and tallianine, which produce marked leucocytosis, no increase in the quantity of opsonin could be found. Working with nuclein, from yeast, they found, however, within a few hours, a marked increase in the opsonic content—frequently

unassociated with any leucocytosis. Huggard and Morland have also shown in man, that the internal administration of yeast (Presshefe, brewer's yeast, Levurosine, ferment de raisin) produces an opsonic rise. They observed, however, a very extensive leucocytosis within half an hour after the yeast had been taken.

The main conclusions which have been reached at the present time are :—

1. In a large number of infections, it can be demonstrated that protective substances of the nature of opsonins exist in the serum.
2. The opsonin is thermolabile.
3. The opsonin acts upon bacteria so that the latter can subsequently be engulfed by the leucocytes.
4. Where different bloods are compared, the variable factor is the serum, and not the leucocyte.
5. Increased leucocytosis is not constantly associated with increase in opsonin.

The exact manner in which the opsonin acts on the microbe is not known for certain, although numerous attempts to demonstrate that it is a bactericidal action have failed. The experiments of Bulloch and Atkin make it probable that some physical alteration of the microbe is induced, rather than that the opsonin acts as an amboceptor, capable of uniting on the one hand with the bacterium, and on the other hand with the protoplasm of the leucocyte. The salt content of the mixture of serum bacteria and leucocytes is a point of fundamental importance, but still requires elucidation. The behaviour of opsonin in presence of various salts has been studied by Hektoen, and Ruediger, and by Western.

The practical importance of all these researches consists in their relation to the question of the treatment of infections by the inoculation of vaccines, a method which apart from the work of Koch on tuberculin has been developed almost exclusively by A. E. Wright and his pupils at Netley, and at St. Mary's Hospital. In the majority of cases, the vaccine employed is a culture of the microbe which has been the cause of the infection. This culture is suspended in salt solution and sterilised by heat at a temperature of 65—70° C. Other methods of producing a vaccine are also in vogue in the

case of tuberculin which is either a concentrated bouillon filtrate (T.O.) or the bodies of the tubercle bacilli are ground to pieces and then suspended in an indifferent fluid (T.R. also "new tuberculin bacillary emulsion" the most recent preparation advocated by Koch). The therapeutic value of such vaccine treatment, as claimed by Wright, is easy of demonstration. The rational explanation of the results is not so clear. It is an apparent paradox that an individual may suffer from a staphylococcic furunculosis for months, and yet the introduction into his subcutaneous tissue of a small quantity of the very coccus, which has been the cause of his trouble, may bring about a rapid disappearance of already existing boils, and a prevention of others, which, according to all clinical evidence, would have occurred. Here we have a typical example of the isopathic doctrine "*æqualia æqualibus*" emphasised so much by Von Behring.

One would have thought that absorption of vaccinating material from the localised infected area would have taken place, and given rise to an immunity. This, no doubt, does happen in many cases, whereas in others the extreme chronicity of the infection shows that it is often wanting, or, at any rate, very imperfect. It is not at all improbable that many infections are extraordinarily circumscribed, and to all intents and purposes outside the body: a view which harmonises with the theory, lately set forth by that eminent pathologist Theobald Smith, that the "tendency of all invading micro-organisms in their evolution toward a more highly parasitic state is to act solely on the defensive while securing opportunity for multiplication and escape to another host." In such cases, the injury done to the tissues ending in necrosis, the plugging of vessels, etc., all help to keep the bactericidal and opsonic forces at bay, the parasite remaining locally and being at long intervals discharged outward. This would serve to explain why antitropins are produced in insufficient amount.

By inoculating the dead vaccine under the skin, we have, however, the means of increasing the antitropic content of the blood, as experience with diphtheria toxine shows that subcutaneous inoculation gives the greatest prospect of maximal antitoxic formation. In point of fact, there is a good deal of evidence to show that antitoxin may be formed locally.

Granted, then, the occurrence of excessive antitropic formation, does it follow that this alone will lead to cure? In many cases, where the infection is not so localised as to be practically outside the body, this does ensue. In other cases, we may find, *e.g.*, in lupus and pulmonary tuberculosis, that the opsonic content of the serum is higher than normal, and still the individual remains the subject of a chronic infection for years. Here it is not improbable, nay it is a fact, that where the conditions of the circulation have been rendered advantageous, to the extent that the blood laden with its antitropines can bathe the affected parts, cure is more easily brought about. Experiments readily demonstrate that, if the pus of an abscess is centrifugalised, the fluid part will be found devoid of opsonin, although the circulating blood may contain a quantity of opsonin approaching normal. When the abscess is opened, the cure does not occur by the mere letting out of the exudate and the bacteria therein contained. It acts, in all probability, by permitting the lymph, which has been kept from circulating by the pressure and other causes, to flow through, carrying with it its microbicidal attributes. The virtues of "blood determination" and hyperæmia have been extolled in all time. Cucurbital, cataplasms, fomentations, rubefacients, counter-irritants, and the cautery have come down to us from the dawn of medicine. At the end of the nineteenth century, we have seen the most perfect methods for producing a blood flux in the mechanical devices of Bier. The beneficial results of Finsen-therapy are largely referable to the inflammation produced.

As, however, it is not intended that this short *résumé* should be a disquisition on obscure points of medical theory, we may, with more profit and expediency, proceed to the practical therapeutic issues of this whole question.

The method of determining the opsonic content of the serum has already been referred to. As a rule this is stated as the opsonic "index." The reason for this is that it is not possible, in two tests with different emulsions of one and the same bacterium, to obtain comparative results. As used at present, the test must be controlled by the results obtained with the serum of a normal individual under the same conditions of emulsion and leucocytes. The opsonic index is the result obtained by dividing the number of bacteria taken up

per leucocyte in the presence of any given serum by the number taken up per leucocyte in the presence of the serum of a normal individual, which latter is regarded as unity. Thus—

Staphylococci per leucocyte in the presence of a given serum = 14.

Staphylococci per leucocyte in the presence of a normal serum = 20.

$$20 : 14 :: 1 = \text{opsonic index } \cdot 7.$$

Variations in the Opsonic Content of the Serum of Healthy Individuals.—If comparative results are to be obtained by different investigators, it is of fundamental moment to know what variations, if any, occur in a series of individuals presumably healthy, or, at any rate, not affected with the particular microbe, against which the phagocytic power of their sera is to be tested. The largest series of determinations have been made by Bulloch in the case of 34 medical students and 32 hospital nurses. The test material was tubercle bacilli, and the results showed only a very slight variation from a minimum of $\cdot 8$ to a maximum of $1\cdot 2$, as compared with an index of 1 of the serum of the investigator himself. The average for the whole 66 cases was $\cdot 95$. These results compare closely with those obtained by Urwick in 20 cases, where the average was $1\cdot 006$. Taking the two series together, we have 86 healthy people with an average of $\cdot 97$.

The same apparently applies to the opsonic index for staphylococcus, although determinations on a big scale have hitherto not been published. The figures quoted above are probably sufficient to allow of the deduction that, as measured by Wright's method, the opsonic index in healthy people varies only within small limits.

Urwick has also shown that, in healthy people, the index does not vary from day to day. Thus the serum of a healthy individual compared with Urwick's serum showed the following indices on the following dates:—

November 1 = $1\cdot 1$.	December 5 = $0\cdot 9$.
„ 8 = $1\cdot 0$.	„ 8 = $0\cdot 9$.
„ 12 = $1\cdot 0$.	„ 13 = $1\cdot 0$.
„ 30 = $1\cdot 15$.	„ 14 = $1\cdot 0$.
	„ 19 = $1\cdot 0$.

The opsonin is a relatively stable substance in the serum

and does not suffer deterioration for at least 12 hours after its withdrawal from the body. The writer has frequently tested normal serum, which had been 18 hours outside the body, and had been subjected to a 12 hours railway journey. No loss of opsonic power could be determined under these conditions.

Variations in the Opsonic Content of the Serum in Disease.—

The earlier experiments of Wright in the cases of staphylococcoses and localised tubercular infections showed a lowering of the opsonic index below unity.

In a series of 20 localised staphylococcic lesions, he found indices varying from $\cdot 1$ to $\cdot 88$ with an average for the 20 of $\cdot 62$. In a further series of 17 cases of tubercle (exclusive of pulmonary phthisis), he found variations from $\cdot 4$ to $\cdot 85$ with an average for the 17 of $\cdot 64$.

Urwick, who examined 54 cases of tubercular infection, including a large number of phthisis in all its stages, obtained a different result, in so far that in many cases, especially of phthisis, the index was above normal, the variations extending between $\cdot 3$ and $2\cdot 6$. In 33 cases of phthisis, he noted an index above 1 in 25 cases, an index below 1 in 7 cases, and in 1 case the index was unity.

Bulloch has published an investigation into the opsonic indices of 150 patients suffering from lupus. In this series, were cases of the mildest character up to the most severe forms, which had lasted and defied treatment, for as long as 40 years. Compared with the average opsonic index of $\cdot 97$, obtained in the case of healthy people, the average for the 150 cases of lupus was $\cdot 75$, the distribution being as follows :—

Opsonic Index.	Number of Cases.	Percentage.
Between $\cdot 2$ — $\cdot 3$	3	2 per cent.
„ $\cdot 3$ — $\cdot 4$	3	2 „ „
„ $\cdot 4$ — $\cdot 5$	21	14 „ „
„ $\cdot 5$ — $\cdot 6$	29	19·6 „ „
„ $\cdot 6$ — $\cdot 7$	33	22 „ „
„ $\cdot 7$ — $\cdot 8$	22	14·8 „ „
„ $\cdot 8$ — $\cdot 9$	18	12 „ „
„ $\cdot 9$ — $1\cdot 0$	7	4·6 „ „
„ $1\cdot 0$ — $1\cdot 4$	14	9·3 „ „

In 25 cases of uncomplicated localised staphylococcic

lesion, Bulloch found the index below normal constantly. In one case of diabetes, with severe carbuncles, the index, however, was 1.4.

The high opsonic indices obtained by Urwick and others in cases of pulmonary phthisis are of extreme interest, and afford room for speculation. It is known that tubercular individuals are extremely sensitive to the action of quite minute doses of tuberculin, and one can conceive that, where the disease is progressing, the tubercular toxin may be absorbed, especially in a highly vascular organ like the lung, and thus lead to a partial vaccination and consequent rise in the opsonic index. This is borne out by repeated tests made in such cases. Here Urwick found a succession of positive and negative phases, the index sometimes being high, at other times low.

Diagnostic and Prognostic Value of Opsonic Test.—Much more evidence must be accumulated before a definite opinion can be expressed upon this important question. From the determinations made by Bulloch, it would appear that an index below .8 is abnormal. Whether it actually represents that an infection has already taken place, or merely may take place, it is impossible to say, as the diagnosis of very early stages of tubercle, especially in the lung, is an impossibility without resort to the tuberculin test. An abnormally high index is probably a sign of infection, but it cannot be used prognostically, as it may occur in cases which do well, or in those which are quite hopeless. The determination of variations at successive periods is probably of more importance in forming an opinion on the future of the case.

Much light is also required on the interpretation to be placed on low indices. The question whether they are the cause, or the effect, of the infection is unanswerable at the present moment. The determination of the indices of the sera of families, with a notorious tubercular disposition, would be a possible aid in the solution of this question. In a number of picked cases of "sanatorium cures" of phthisis in its early stages, Bulloch constantly found low indices. Here again it would be important to know whether such cases relapsed as so frequently happens. It seems to the writer, that the low index probably precedes the infection, and is possibly due to some hereditary, or acquired, imperfection in

the mechanism, by which the antitropines are manufactured. The depression may also continue long after the actual infection has been cured. Thus, an eminent scientist contracted a localised pleurisy, in the exudate of which, tubercle bacilli were found by inoculation. After medical and open air treatment, whereby he was restored to florid health in 12 months, his opsonic index was found on several occasions to be .4.

Increase of Opsonic Index as a Result of Inoculation.—Wright and Douglas observed that the introduction of a vaccine raises the opsonic index above normal, but apparently the quantity of opsonin is not capable of the enormous increase which one constantly notes in the case of antitoxin. Speaking generally, one rarely sees indices much above 2.0, and the serum apparently cannot be carried to great dilutions, without ceasing to manifest its opsonic effect. Why this should be so is not apparent, although it is remarkable in the light of the fact that, in none of the infections, in which an opsonic action is known to occur, and to be the main element of defence, is the immunity very high. There are also other problems in connection with the opsonic immunity curve which require further study. Wright's "high tide" phase is not maintained indefinitely, as a subsequent fall to normal, or even below this, is the rule, and often in a very short time. This, coupled with the fact that improvement in the patient's condition may go on long after the curve has descended to the normal line, or below it, would lead one to believe that other factors, which at present cannot be measured, are at work. Take, for example, a type of common occurrence, a case of localised staphylococcus infection, which has lasted for months or years, and has resisted all ordinary treatment. A first inoculation of staphylococcus vaccine may produce an immense improvement, but still cure is not obtained, a second, third, fourth, or even fifth inoculation may have to be given without the inoculator being satisfied that the condition is really cured. After a rest of weeks, or longer, the patient may present himself without a trace of the infection, and, so far as one knows, this may continue for an indefinite period. The fluctuations in the opsonic index, in this period of increased improvement

are not known, this being due to the immense amount of labour involved in the construction of a daily curve from phagocytic observations. The labour, in fact, is so great that, despite the lapse of 12 years, since the publication of Ehrlich and Brieger's first tetanus immunity curve, less than a dozen similar curves have been worked out for other experimental intoxications. In the absence of such data, one can suppose that the action of the vaccine has been such that the anti-tropic mechanism is more easily stimulated to reaction, and responds to minute doses of the toxine, or, failing the demonstration of fluctuations in the index, it is conceivable that a histogenic immunity has been acquired. Behring, however, who opposes the histogenic immunity to the humorigenic, regards the former as always inherited, and he considers that its acquisition in the life of the individual is not proven. The great value of opsonic determinations consists in connection with the actual treatment, and especially when to dose, and what quantity of vaccine to inoculate. A definite opsonic curve ought to be constructed for every patient under treatment, especially if the best results are to be obtained in the shortest time. It must be remembered that these vaccines are potent substances—witness, for example, the effect on a case of lupus of inoculating $\frac{1}{1000}$ of a c.c. of tuberculin—and if they are given in the happy-go-lucky attitude associated with the exhibition of a 12-oz. stomachic drench, disaster will ensue. Inoculation of human beings is a scientific process, involving a deal of attention and skilled labour, and, so far as can be seen at present, there is no royal road to the desired end, except by following the principles above enunciated.

Preparation of Vaccine.—Above everything, Wright has shown the necessity of working quantitatively in this whole inoculation process, and this applies as much to the standardisation of the vaccine as to the determination of the opsonic index. For microbes like staphylococcus, pneumococcus, bacterium typhi, &c., Wright determines the number of bacteria quantitatively by mixing definite volumes of normal blood and the emulsion of the culture, a film being then prepared of the mixture; after staining, the proportion of bacteria to red corpuscles is determined by counting a number

of microscopic fields, and the bacteria are estimated from the fact that 1 c.c. of blood contains 5,000 million red corpuscles. A modification of this method has been described by Harrison, and is claimed by him to be more accurate.

In the case of tubercle vaccine the most convenient form is the "new tuberculin bacillary emulsion," prepared by Meister, Lucius, and Brüning at their factory at Höchst, and sold in bottles containing presumably 10 milligrammes of solid substance per c.c. The original Koch's tuberculin (T.O.) can be obtained from many sources.

Results hitherto obtained by Inoculation Method.—(a) *Localised Staphylococcic Lesions.*—These were the first infections dealt with therapeutically by Wright, and his results have been published in several memoirs. The quantities of staphylococci used for inoculation vary from 500 to 2,500 millions for a dose. With a medium quantity such as 1,000 millions of cocci, a certain amount of stiffness may be developed at the point of inoculation; as a rule no general symptoms are manifest. Wright's 20 published cases include acne, furunculosis, sycosis, mostly of a severe and intractable type. Knowing this, one cannot but be struck with the results which he has achieved. The writer has treated 11 staphylomykoses by Wright's method, viz., 5 cases of facial acne, 4 of furunculosis, and 2 of sycosis. With the exception of one case of sycosis, all the others were chronic, and had defied ordinary therapeutic measures. The majority of the cases were medical men or students, and the previous treatment of these cases had been most rigorously carried out under the best possible conditions but without avail.

Such inveterate cases offer the most severe test of the method of inoculation. Of the 11 cases, 9 have either been completely cured, or at any rate, immensely improved. One case of boils and one sycosis have shown a great tendency to relapse, and cannot be regarded as cures. The sycosis case was one of unusual severity, which had lasted several years. Every manner of treatment had been tried, from ointments to X-rays, without result. At first, the improvement was so extraordinary that there seemed every prospect of achieving a rapid and complete cure. When the patient presented himself, the beard region was densely indurated, and covered with

hundreds of pustules. After the second inoculation no pustules remained. The improvement, however, was short-lived, as the disease relapsed, and despite four more inoculations the patient left uncured, although considerable amelioration had taken place. The most aggravated case of acne indurata had lasted seven years. It required nine inoculations, spread over three months, to dispel this entirely. Generally speaking, the writer has required to give more inoculations than Wright in his cases.

The method of inoculation has also been applied in other infections, but so far very few reports have made their way into literature. Glover Lyon has recorded the history of a case of pneumococcic empyema, which, in spite of operation, did not progress satisfactorily, in so far that nine weeks after the resection of the rib there was a considerable discharge. The inoculation of 100 millions of pneumococci at once gave rise to improvement, and by two subsequent inoculations complete cure was brought about. Macdonald has made an important contribution in reference to the pathology of the pneumonic crisis. At the commencement of the infection, while the temperature is in the ascendant, and during the fastigium, he found that the opsonic index is below normal. With the onset of crisis, there is a striking rise in the opsonic content, the index rising critically as high as 1.6.

Tubercular Infections.—Wright has published the histories of a number of cases of localised tubercle treated on the principles he has advocated. The vaccinating material was Koch's new tuberculin. The cases, which he has had to operate upon, may be described as the incurable refuse of the hospital—patients who had passed uncured from the resplendent operating theatres of the senior staff to the Cimmerian obscurity of the out-patient dressers' department. The results, which he has had with such cases, were demonstrated to the party of French physicians and surgeons visiting the London hospitals in October, 1904, and evoked great interest and enthusiasm. It has come out of these results that new tuberculin possesses marked curative properties, and, if anything is likely to reinstate tuberculin as a great therapeutic remedy, it is his demonstration that minute doses suffice to effect a cure. The dose, hitherto recommended and administered, would

seem to be enormously in excess of what is actually required. Naturally, one cannot expect to cure in a week or two a tubercular infection that has lasted for ten years. The treatment must be prolonged, and the doses administered at suitable times, as determined by the fluctuations of the opsonic index. The writer has treated one case of tubercular disease of the testis and prostate in the person of a surgeon, who, after various operations, was pronounced by one of our greatest surgeons to be 'beyond the reach of further surgical interference, as the disease had continued to spread. Within a relatively short time the lesions had disappeared, and the patient is now almost well.

Possibilities of the Inoculation Method.—From the results hitherto obtained, there is no doubt that the principle of therapeutic inoculation will persist in practical medicine. At the present, it is impossible to forecast its possibilities, but it may prove to be the key to the cure of the great numbers of localised infections, which are met with in everyday medical practice, and which the art of medicine has been, up to the present time, relatively impotent to cope with. This is all the more likely if the method is adopted as the first line of treatment, instead of a *dernier ressort*, after the defensive mechanisms have fallen into desuetude and lethargy, from long-continued disuse of their powers, and the gradual invasion of the parasite. Experience at present being accumulated leads to the belief that even generalised infections of protracted course may be considerably shortened by appropriate inoculation.

An important question arises as to how all this work is to be accomplished. The system of treatment is a complicated one, and it is difficult to see where simplification can be introduced. The performance of the procedures advocated by Wright necessitates time, skill, and the use of a laboratory, and the problem will, perhaps, best be solved by our great hospitals undertaking, to a large extent, work of this class. Already, by the foresight and generosity of the medical staff and governing body of the London Hospital, a paid department has been organised in this hospital for the therapeutic inoculation of patients, and for the accumulation of data as to the value of this line of treatment.

Nineteen hundred years ago Celsus wrote that "medicine is a conjectural art, and that the nature of conjecture is such that, although it answers for the most part, yet sometimes it fails." Whatever may be the final verdict as to the range of therapeutic inoculation, there is no doubt that, from the purely scientific side, the work of A. E. Wright has opened up new fields, and has proved itself heuristic in a high degree, and when the history of latter-day medicine comes to be written, it is probable that his work will rank beside the classical researches of Pasteur, Lister, and Koch.

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OBSERVATIONS UPON THE IMPORTANCE
OF BLOOD-CULTURES, WITH AN ACCOUNT OF
THE TECHNIQUE RECOMMENDED.

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[With Plates XXI.—XXIV.]

THE examination of the blood by cultivation, for the purpose of discovering the presence of micro-organisms, has become a matter of great importance in the diagnosis and treatment of septicæmia. Recent research, in connection with the various problems of immunity, gives considerable promise that at last a door has been opened which may lead to rational therapeutics in cases of blood infection. It is still necessary, however, to emphasise the need of more frequent investigations of the kind about to be described. For several reasons, these investigations have been too often omitted altogether, or, what is equally to be deplored, carried out too late. The earlier results, even in cases of undoubted septicæmia, were very frequently negative. The method of examination now adopted is erroneously thought to be distressing to the patient. A third and more general reason for the omission is the failure to recognise how essentially different cases may really be those which are loosely classed together as "septic."

It is not difficult to combat these reasons for the omission of a means of accurate diagnosis. Improvements in the methods of performing blood cultures, and in bacteriological technique generally, have led to many more positive results than were formerly obtained. From an analysis of more than a hundred blood-cultures undertaken during the past two years, I find that positive results have been obtained in 85 per cent. of cases of undoubted septicæmia, that is, cases proved to be so either *ante* or *post-mortem*. In other words, it is possible, within an error of 15 per cent., to decide, by means of a blood-culture, whether or not a patient is suffering from septicæmia. The distress caused to the patient by the examination is very little more than that caused by the

performance of a blood-count. The failure to realise the fact that to label a patient "septic" goes but a very little way towards establishing a diagnosis is much to be regretted. For, without an accurate diagnosis, and without an early one, we minimise the patient's chances of recovery by denying him the benefit of proper treatment. If his disease is amenable to surgery, it is well that this fact should be ascertained as soon as possible. If his disease be a true septicæmia he should, as early as possible, be given whatever help serum-therapy offers. This help may not, as yet, be very great; it is quite certain, however, that it cannot but be less, if the diagnosis is delayed, and that it is reduced to a minimum, if the serum chosen is not immunised against the causal organism of the disease.

It may be that serum-therapy, hitherto rather disappointing when applied to cases of septicæmia, will shortly give place to some form of vaccination in the effort to combat this serious disease. But *the future treatment of septicæmia, whether by serum or by specific inoculation, must depend for its success upon the isolation from the patient's blood of the organism present, and at as early a stage of the disease as possible.* There are at present many facts which suggest that a careful study of the clinical and bacteriological aspects of cases of septicæmia is much needed to supplement the knowledge gained by laboratory work in connection with immunity. In cases of suspected septicæmia, accurate diagnosis is quite impossible without a blood-culture. (1) The existence of a septicæmia can only be proved by such an investigation, and, if septicæmia be present, (2) it is only by this means that the nature of the blood infection can be determined.

(1) *The Diagnosis of Septicæmia.*—On clinical grounds alone this is often impossible. (a) In some cases, the general disturbance of the body functions is so slight that the existence of a general blood infection is not suspected. Yet in these patients, a blood-culture may reveal the fact that organisms, even in considerable numbers, are present in the circulation. In cases of chronic valvular disease, this condition of things is not at all uncommon. Patients not seldom suffer from ulcerative endocarditis without the disturbance to their general health being sufficient to take them to their doctors for advice. An anginal attack, some dyspnoea of unusual severity, an intercurrent illness, quite unconnected with their old heart mischief,

either of these, or some other thing, may bring them under close observation, and suspicion is aroused as to the real nature of their illness. The duration of cases of malignant endocarditis may be very much prolonged, up to two or three years. During much of this time, the patients may be treated for the less important element of their disease, the valvular defect, without the more dangerous element, the infective one, being recognised. The presence of fever in a case of valvular disease should always be regarded with seriousness, and, if no quite obvious cause of the pyrexia be discovered, a blood-culture should at once be undertaken. (b) In other cases, the general disturbance is very considerable, suggesting a diagnosis of septicæmia; whereas, in reality, the patient is suffering from a local infection with an intense degree of toxic absorption. This difficulty in the diagnosis between local and general infections is an everyday problem in the sphere of gynæcology, but it is a problem of very great importance both with regard to prognosis and treatment.

(2) *The Nature of a Septicæmia*.—Septicæmia is a disease in which micro-organisms exist in the blood and multiply there. But the actual organism present in any case may be one, or more than one, of many. Its nature can only be determined by means of blood-culture. Some bacteria are found to cause septicæmia very often, such as the streptococcus group; others cause septicæmia fairly often, as the pneumococcus and staphylococcus pyogenes aureus; bacteria of a third group much less often transgress the barriers of the tissues, in which they have their usual nidus, and appear in considerable numbers in the circulation, such as the gonococcus and the influenza bacillus.

To act as if the causal organism in any particular case of septicæmia is a streptococcus, is to substitute a treacherous assumption for a possible proof or disproof. More than this, in order to give an antistreptococcus serum a fair trial, it is necessary to treat the patient with a serum prepared against a streptococcus having similar characters to that causing the patient's disease. In order to do this, the organism must be isolated, and its properties investigated. In chronic cases of streptococcus septicæmia, it is possible to do even more than this, as I have elsewhere shown¹: a serum may be specially prepared by use of the actual organism obtained from the patient.

¹ *Lancet*, July, 1904.

At a time when bactericidal sera are on trial, reported cases of the cure of septicæmic patients by anti-streptococcus serum should be rigidly excluded from medical literature, in the absence of bacteriological evidence that the causal organism was a streptococcus. Or, if reported, attention should be drawn to the absence of this all-important element in the diagnosis. I have seen cases both of pneumococcus and of gonococcus septicæmia treated by anti-streptococcus serum, before blood-cultures demonstrated the real nature of the organisms causing the disease. Had either of these patients chanced to recover, the publication of the case might well have been undertaken, and the list of recorded successes for the serum be thereby falsely increased. The disrepute, into which serum-therapy has not unreasonably fallen in the eyes of many medical men, is largely due to the reports of cases in which no bacteriological evidence at all is forthcoming relative to the existence, or nature, of a septicæmia.

There are three available *methods of examining the blood for organisms* :—

(1) *Blood films* may be made directly, and stained by some basic dye, as gentian-violet, carbol-fuchsin, or Romanowski's stain. This method demands that the organism shall be present in very considerable numbers, and it is, therefore, not of great service, but, as it is so simple, and can easily be combined with an examination directed towards the differentiation of the leucocytes present, it should not be omitted. It is, of course, the only method available, when the organism is one which defies attempts at cultivation outside the body, or reproduction of the disease when inoculated into animals. Such an organism is the malaria parasite, in the study of which blood films have proved of the greatest importance. The recently described spirochæte, obtained from the blood of patients suffering from syphilis, must likewise be dealt with in similar fashion for the present.

(2) The second method is to bleed the patient, and to *inoculate some suitable animal* with the blood. This is obviously not a convenient method, but it may be reserved for special cases.

(3) The third method is that of *blood-culture*, by which various nutrient media are inoculated with the patient's blood, this being obtained with strict aseptic precautions. This is the method in general use and dealt with in this article.

Formerly the blood was obtained for the cultures by pricking the ear or finger. There are two objections to this process : the amount of blood rapidly obtainable is limited, and the risks of contamination of the blood by organisms from the patient's skin, or from the air, are considerable. The former of these objections is entirely, and the latter, almost entirely, overcome by taking the blood from a vein of the arm, by puncturing it with a sterilised hollow needle, the skin also being sterilised so far as possible. As only a minute area of skin is dealt with in the actual puncture, the risk of cultivating contaminating skin organisms is very small. By this method, air contaminations should not occur at all. The puncture is fraught with very little pain, provided a sharp needle be used, and the skin promptly and completely pierced ; care must be exercised to avoid inserting the needle *into* the skin rather than *through* it. I have performed the operation in quite young children without evoking tears, which is a fairly severe test.

Apparatus.—A very convenient and simple form of apparatus for use in blood cultures is that illustrated in Fig. 1 ; it was made for me by Messrs. Burroughs and Wellcome. Hitherto it has been necessary to collect the various articles each time a blood-culture was required. This process, simple enough when a well-stocked pathological laboratory is close at hand, becomes very troublesome when the patient is at some distance from the laboratory, or when ready access to it cannot be obtained. A stoutly made case, measuring only $7 \times 6 \times 3\frac{1}{2}$ inches, the top and front of which are made to open, contains all the requisite materials. At the back of the case is fixed a rack which is made to hold six culture tubes of the customary size. A central hole in the rack contains a glass-stoppered bottle of ether. The rack is continued along one side of the case, and holds a bottle of methylated spirit for supplying the two metal spirit lamps lying beneath this part of the rack. One of these lamps is used to heat the metal case containing a 5 c.c. glass syringe and needle ; the other lamp sterilises the Ehrlenmeyer flask of dilute sodium citrate (.5 per cent.) seen in front of the culture tubes. The case containing the syringe has fixed to it a collapsible stand. The tripod for the flask of citrate solution consists of a flat-metal ring, into which fit three supporting pieces, the whole forming a tripod capable of disconnection. A pair of forceps, a roll of compressed bandage, and a packet of

compressed absorbent wool complete the outfit. The illustrations make these points clear. If the rack is kept supplied with tubes of the usual media (broth and agar), the apparatus is ready for instant use, however remote the patient may be from the laboratory. When the cultures have been made, the flask of citrate solution can be heated, and put back in its place; the warmth from the flask assists in keeping the tubes near to the requisite temperature (body heat), until they can be transferred to the warm incubator. A few pads of cotton-wool placed around the flask helps this process still further.

Points in Technique.—In obtaining the blood, that arm is chosen in which the largest veins are seen beneath the skin of the ante-cubital fossa. The patient lies near the edge of the bed, on the same side as that of the arm chosen, and in a good light. The skin is scrubbed with soap and water for five minutes, and is then covered by a piece of gauze, or cotton-wool, wrung out of recently boiled water or lotion. Elaborate attempts at complete sterilisation of the skin by chemicals are quite unnecessary. Experience shows that they give no better results than simple cleansing by soap and water. Moreover, they suggest to the patient that preparations are being made for some form of major surgery—a suggestion to be avoided. During the preparation of the arm, the syringe and needle are being boiled, the water used for this purpose being at first cold, or at most tepid, as the syringe is of glass. The citrate solution is also being boiled at the same time. The flask of citrate solution is then cooled under a tap, or, by standing it in a basin of cold water, until it feels just warm to the hand. The flask and the syringe (still in the boiled water) are placed near the bedside. The arm is now allowed to hang out of the bed, and two or three turns of bandage are taken round it, well above the elbow, tightly enough to cause the veins to stand out prominently. This effect is often increased by the patient squeezing the roll of bandage in his hand. In plethoric persons, and in most men, the bandage is not often required. But many of the patients are both anæmic and wasted; these preliminary efforts at rendering a good sized vein visible through the skin are then well worth attention, as thereby disappointment is often avoided when the puncture is made. In some cases, a vein may be felt when it cannot be seen; the

puncture is just as likely to be successful when this is so, as when the vein is clearly visible. The syringe and needle are now fitted together; the piston should be taken out of the hot water before the cylinder, so as to allow of the contraction on cooling affecting the former earlier than the latter; no time is then lost in fitting the parts quickly, and exposure of the piston to the air is avoided. The syringe and needle are rinsed out with the sterile water in which they have been boiled; during this process the junction of syringe and needle can be tested, and, if air enters, it must be made firmer. Enough of the citrate solution is now taken up to fill the needle and the neck of the syringe. This is to prevent rapid clotting of the blood, and to allow of its being squirted out of the syringe. The gauze is removed, and ether is poured over the skin, the arm meantime being held at right angles to the patient's body. The operator stands with his back to the patient; if the right arm is being dealt with, he is below it, if the left is the one punctured, he is above it; this enables the operator to use his right hand for the syringe in either instance. Fig. 2 shows the positions of operator and patient. The vein is punctured in a direction against the venous circulation. In making the puncture, care is exercised lest the syringe at any time inclines with the needle upwards, otherwise the piston, which fits the cylinder very accurately in the case of the instrument described above, may slide a short distance out of the cylinder; air is then admitted, and the full amount of blood cannot be obtained. As stated previously, the skin must be completely pierced, but the direction of the needle must then be parallel with the surface of the skin, so as to avoid puncturing both walls of the vein. The sign of a successful puncture is the blood flowing into the syringe without suction being employed. When this happens, the piston may be gently withdrawn before the incoming blood, until the syringe is filled, but a well-fitting glass piston will often be pushed to the top of the cylinder by the stream of blood unaided by the operator. In any case suction is useless. Either the needle is in the vein, or it is not. If it is, the blood will at least flow into the neck of the syringe; if it is not, no good can come from using suction: the only thing that can happen is that air is drawn in through the junction, or a piece of tissue is sucked into the needle and blocks it. If the latter condition occurs, it is

hopeless to proceed further, the needle must be removed, washed with the boiled water, and a fresh attempt made. If, therefore, no blood flows into the syringe when the skin is punctured, the correct thing to do is gently to move the needle in different directions until the wall of the vein is pierced. The syringe being full, the needle is promptly removed, and the operator's finger is pressed against the puncture and kept there, whilst the bandage is removed and the arm is raised. If this is done, the puncture rarely bleeds, and therefore seldom needs any dressing.

The blood is now transferred quickly to a series of broth and agar tubes, or to agar plates. Other media are rarely, if ever, necessary when dealing with the common organisms of septicæmia. Some authorities hold that a special medium, containing lactic acid, is required in order to isolate the microbe of rheumatic fever, but I have not myself succeeded in isolating from the blood by means of such a medium, any organism which did not also grow in broth. Indeed, I have never cultivated any organism from the blood on special media, which did not grow equally well, or better, in ordinary broth. This is important, because it sometimes happens that broth is the only culture medium available; when this is so, no fear need be entertained that a negative result from a blood-culture is due to the lack of special or solid media. Most of the organisms, which cause septicæmia are, after all, either capable of vigorous growth on ordinary media, or are distinctly hæmophilic, in which case the resulting blood-broth medium is a very good one for cultivation. I am in the habit of using four 10 c.c. broth tubes and two sloped agar tubes. In the four broth tubes, different dilutions of the blood and broth are made, from one containing a few drops of blood to the 10 c.c. of broth, up to one containing 2 or 3 c.c. of blood to the 10 c.c. of broth. The objects in view are (i) to dilute any anti-bodies which may be present and prevent growth of the organism, and yet (ii) to have a good bulk of blood in one or two of the tubes so that if the organisms are very scanty they may still be cultivated. These different dilutions are made on account of theory. I have not found them to be of any practical value, save that the knowledge of how much blood is contained in each tube enables the observer to estimate the number of colonies per cc. of blood. The blood would

PLATE XXI.



Fig. 1.



Fig. 2.

PLATE XXII.

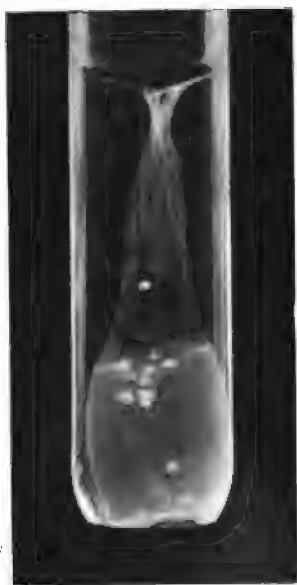


Fig. 3.

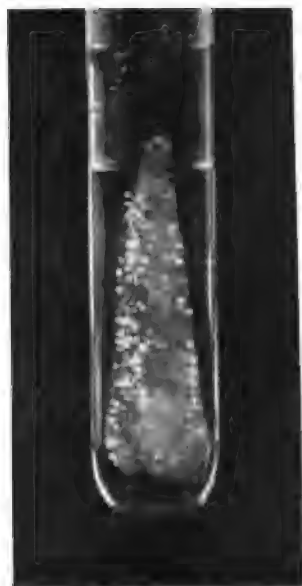


Fig. 4.



Fig. 5.

appear to possess little, if any, bactericidal power in regard to organisms causing true septicæmias: In my own experience, growth has never occurred in tubes where the blood has been well diluted, and not in the tubes containing much blood. Into one of the agar tubes, a little blood is put, and allowed to spread well over the surface of the slope. Into the other agar tube, a larger quantity of blood is squirted, and allowed to remain at the bottom of the slope: in this tube practically undiluted blood is being incubated. After inoculation, the broth tubes are rolled between the hands, and are then placed vertically in the warm incubator (37° C.) *where they are allowed to remain absolutely undisturbed*. In this way, the blood is found to have clotted in a few hours, the pigment sinking to the bottom of the tube, leaving a translucent jelly-like clot suspended in the broth; in this clot colonies of any organism, which may be present, develop as isolated masses, easily distinguished and counted. (Fig. 3.)

I have purposely described the various steps in performing blood-cultures in detail. The process seems a lengthy one on paper; in actual practice, however, it can be done in less than half an hour, this time including the preparation of the patient and the inoculation of the tubes. The tubes are examined in 12, 24, 48, and 72 hours from the time of inoculation. By this time, all the ordinary bacteria infecting the blood will have grown, if present.

If the method of blood-culture described above is adopted, contaminations will be found very infrequently indeed. If they occur their elimination is easy. The commonest organisms to occur, as contaminations, are *Staphylococcus epidermidis albus* from the skin, and various *Sarcinæ* from the air. The latter are quickly disposed of; the former is distinguished from *S. pyogenes albus* by the absence of pathogenicity in animals, the slow liquefaction of gelatin, its presence in broth cultures chiefly as diplococci, and, if need be, by the following series of metabolic reactions:—clotting takes place in milk, neutral red changed in anærobic culture, acid formation in lactose, saccharose, and maltose, no acid formation in mannite.¹ It should be stated that unless the same organism can be

¹ I am indebted for this series of reactions to Dr. Mervyn Gordon, whose results I have had opportunities of confirming.

demonstrated in each of the tubes, considerable distrust must be entertained that it has come from the blood.

In dealing with tubes, which are apparently sterile when examined in the usual way by means of a good lens after 24 and 36 hours, two further points must be observed,—(i) the condensation fluid in the agar tubes must be examined microscopically, and (ii) the broth tubes must be given a fresh roll in the hands, and the agar slopes re-inoculated from the condensation fluid by tilting the tubes, both series being then incubated for a further 24 hours. If at the end of this time, careful examination still fails to reveal the presence of any organisms, the blood-culture may be said to be negative. The re-inoculation of the agar slope by bathing it with the condensation fluid, sometimes enables the observer to identify the organism by obtaining typical colonies which were not present on the surface before. (Fig. 5.)

If organisms are found when the tubes are examined, sub-cultures should be made on agar, on gelatin, and in broth. Serum and blood-media need not be used, because, in making the sub-cultures, some blood is always carried over with the organisms, and this allows of the growth of even such strictly hæmophilic bacteria as the *B. influenza*. [Second sub-cultures of an organism may require, however, appropriate media to keep it alive. But the diagnosis will already have been made.] Organisms obtained direct from the blood-stream in this way often yield appearances, both morphological and cultural, which differ from those seen when the same bacteria are obtained from other tissues or from secretions. The difference is usually along the line of greater vigour of growth, illustrated by the large size of the colonies, and of the individual members of them, and by the longer life of the cultures. Fig. 8 shows some unusually large colonies of *streptococcus pyogenes* obtained from a blood-culture in a case of puerperal septicæmia. The colonies were large cup-shaped masses, very opaque. Those growing on an agar slope were so large, so raised, and so opaque, that the very elect might have been deceived into thinking them colonies of a white staphylococcus. But cultures of the streptococcus obtained from a pleural effusion occurring in the same patient, showed colonies of the usual size. Fig. 12 is a photograph of colonies of streptococcus obtained from a blood-culture in a case of multiple suppurative arthritis. The

PLATE XXIII.

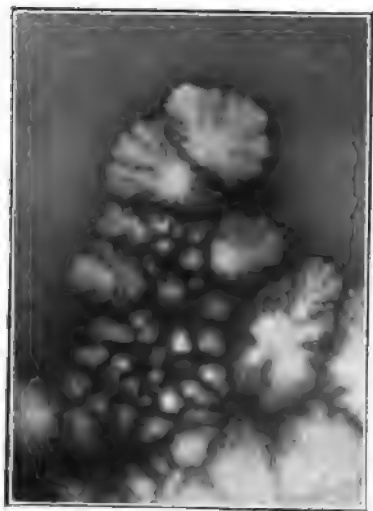


Fig. 6.

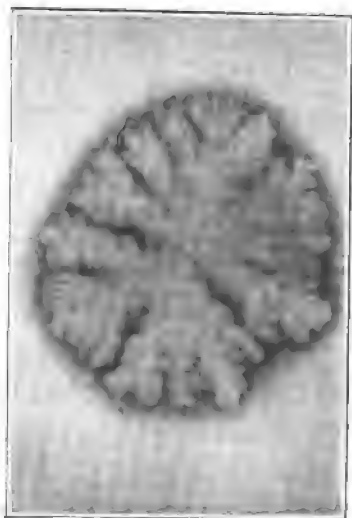


Fig. 7.



Fig. 8.



Fig. 9.

PLATE XXIV.

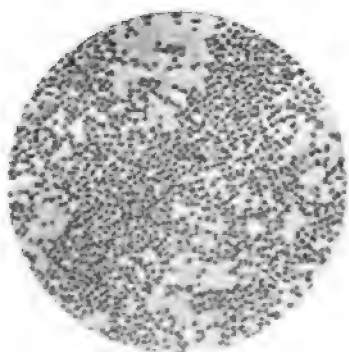


Fig. 10.

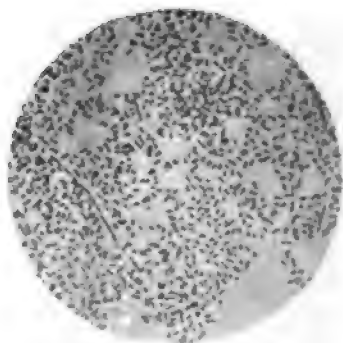


Fig. 11.

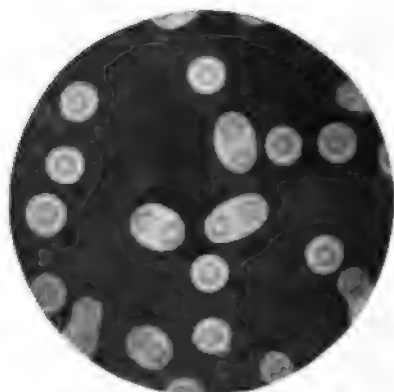


Fig. 12.



Fig. 13.

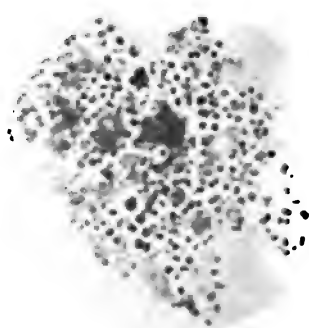


Fig. 14.

agar plate was smeared with a little juice from the spleen of a mouse, that was killed in eighteen hours by intraperitoneal inoculation with a loopful of the condensation fluid from one of the agar tubes used in the blood-culture. Some of the colonies seen in the figure measured 3 mm. in diameter. The configuration of the colonies is noticed to be also unusual, as of two smaller colonies within a larger one.

Fig. 14, representing a film prepared from a 24 hours' growth of gonococci on an agar plate, which had been inoculated with the blood of a patient suffering from gonococcus septicæmia, illustrates the same principle: some of the cocci are seen to be very large. Fig. 7 shows a colony of the same organism a week old, and measuring 4 mm. in diameter. This growth of gonococci was so vigorous that it was utilised for the purpose of preparing an anti-gonococcus serum. I have recently described two cases of influenzal septicæmia diagnosed by blood-culture. In each of the cultures, the particular organism was much more vigorous and hardy in its growth than that described by Pfeiffer, who first isolated the bacillus from sputum and described its characters. Second sub-cultures grew without the addition of blood to the media, the colonies were at first almost opaque (Fig. 5), and the bacilli isolated from the original broth tubes were thicker and stouter than those which are obtained from commoner sources. (Fig. 10.) Sub-cultures of the bacillus, however, soon yielded the typical dew-drop-like colonies (Fig. 13), and films from these gave the more characteristic bacilli seen in Fig. 11. I am not aware that authors have hitherto drawn attention to the atypical appearances, presented by various organisms, when obtained directly from the blood-stream.

Description of Plates.

Fig. 1.—Blood-culture apparatus.

Fig. 2.—Position of patient and operator during puncture of vein. (The arm should be shown depressed.)

Fig. 3.—Broth tube, 48 hours after blood-culture. Illustrating the mode of growth described in the text. The organism present is *B. influenzae*. $\times 1$.

Fig. 4.—A similar specimen, the colonies being very numerous. $\times 1$.

Fig. 5.—Two sloped agar tubes 3 days after blood-culture. Illustrating the effect of inoculation of surface from condensa-

tion fluid described in text. The organism illustrated is *B. influenzae*. $\times 1$.

Fig. 6.—Growth of *gonococcus* on agar plate, third day, from a case of gonococcus septicæmia. The blood has been poured direct on to the plate. The colonies have developed in groups. The crenated outline is very typical. $\times 20$.

Fig. 7.—A single colony of *gonococcus* in a blood-culture a week old. $\times 20$.

Fig. 8.—Broth tube, 24 hours old, with several large cup-shaped colonies of a *streptococcus*. From a case of puerperal septicæmia. $\times 1\frac{1}{2}$.

Fig. 9.—An agar slope two days after blood-culture. Growth of *pneumococcus* has occurred in the condensation fluid in 24 hours, and from this the general surface has been inoculated. In 48 hours the typical ring-like growth is obtained on the medium. From a case of pneumococcus endocarditis. $\times 1\frac{1}{2}$.

Fig. 10.—A film of *B. influenzae* made direct from the colonies seen in Fig. 1. It shows the stout form the organism assumes when growing in a blood-culture. Stained dilute carbol-fuchsin. $\times 1000$.

Fig. 11.—A film of *B. influenzae* made from a sub-culture on glycerin agar of the growth seen in Fig. 1. on the fourth day. The more definitely bacillary forms common in ordinary cultures of *B. influenzae* are seen. $\times 1000$.

Fig. 12.—Colonies of a *streptococcus*, of unusual size and appearance, obtained by blood-culture in a case of general suppurative arthritis. An identical streptococcus was also obtained from the pus from one of the joints. Fourth day. $\times 20$.

Fig. 13.—Colonies of *B. influenzae*. The characteristic translucent dewdrop-like colonies are seen, as usually obtained in cultures of this organism from sputum. To compare with Fig. 5, where the colonies directly grown from the blood are opaque. Fourth day, glycerin-agar sub-culture from organism in Fig. 1. $\times 40$.

Fig. 14.—Film of *gonococcus* made direct from blood-culture, showing great variation in size of the individual cocci, some of which are single and very large. Stained dilute carbol-fuchsin. $\times 1000$.

THE SPREAD OF CANCER IN THE TONGUE, AND ITS INFLUENCE ON TREATMENT.

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[With Plates XXV.—XXVIII.]

THE title explains that I do not intend to allude to the distributions of the secondary deposits that leave the tongue, and lodge in lymphatic glands or elsewhere.

For active surgical purposes, cases of tongue cancer can be divided into three classes.

1. The early case in which there is little disease.
2. The advanced case, but presumably operable.
3. The inoperable case.

The data, from which the following facts have been gleaned, were results of examinations upon the tissues removed by operations in 16 cases, and the post-mortem examinations of three cases, which died at varying times within eight days after excisions of the tongues. All these tongues were excised by Whitehead's method, and all belonged to the second class of case, *i.e.*, the advanced case, but presumably operable. Further, the cancer process began on the side or centre of the tongue, in its anterior two-thirds in all of them, except one in which the cancer began on the under surface of the tip, at the junction of the *frænum linguæ* with the tongue, and early spread to the floor of the mouth.

The point of chief practical importance, which these data teach, is that the tongue, for surgical purposes, must include its extrinsic muscles, and not merely those parts of them that are covered by mucous membrane in the mouth.

It simplifies description to divide the spread of cancer in the tongue into superficial and deep :—

Superficial. (1)—At the outset, one meets the unsolved riddle, how many previously normal epithelial cells in the mucous membrane become the parents of the cancer offspring? Fig. 1 shows the difficulty of the question, the

epithelium of the tongue can be seen undergoing three changes at *A.*, it is undergoing hypertrophy, which is probably due to irritation caused by the approach of the subjacent growing tumour. At *B.* the superficial epithelium is undergoing simple atrophy, probably due to the pressure of the subjacent tumour, which must be greater at *B.* than at *A.* While at *C.*, one of two things is happening, either the underlying tumour has reached, and is invading, the superficial epithelium, or the superficial epithelium contains parent cells of which part of the subjacent tumour is the offspring. The appearance suggests both possibilities. The fact that heterotype mitosis (Farmer, Moore, and Walker) exists in the surface epithelium at *C.*, also supports both possibilities. At present there are no definite data by which the point can be decided, but my impression is that previously normal cells at *C.* have become some of the parent cells of the underlying growth. There is no leucoplakia.

(2) At the same time, I am quite sure that a much greater cause of ulceration in the mucous membrane is its simple atrophy, due to the pressure of the tumour beneath it, as seen in Fig. 1 at *B.*, and in Fig. 2 at *A.*, a process of disappearance greatly increased by the presence of micro-organisms, with which it is usually complicated, as proved by the facts that some healing may actually occur, ulceration may be delayed, and hæmorrhage stopped by careful, unirritating antiseptic treatment.

(3) The last point to which I wish to refer in the superficial spread of cancer in the tongue is the curious limitation of the growth occasionally observed at the middle line, and also to the tip of the tongue's escape from destruction on the same side as the disease (*see* Fig. 3).

There is no mechanical reason why there should be limitation at the middle line; Fig. 4 shows that the median raphe does not extend to the mucous membrane. The lymphatic communication in the mucous membrane is very free across the middle line. I can only explain its limitation in the same way that I showed the limitation of growth in rodent ulcers, viz., they became, at least temporarily, arrested at neighbouring nerve areas and in denervated areas, and its denervation explains the escape of the tip (*see* Fig. 3).

PLATE XXV.

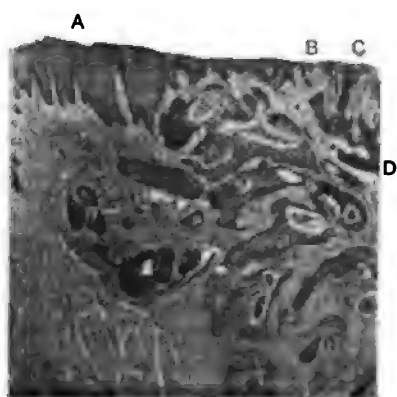


Fig. 1.

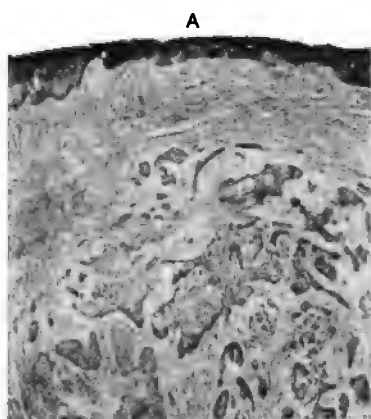


Fig. 2.



Fig. 3.

PLATE XXVI.



Fig. 4.



Fig. 5.

Hence, mechanical, lymphatic, and vascular areas play quite a secondary part in the spread and limitation of growing cancers, always excepting the paths taken by the secondary deposits, which appear to spread by lymphatic and blood-vessel channels. It must not be inferred that, because there exists middle-line limitation in the mucous membrane, the same applies in depths of the tongue; that is not so. In the depths of Fig. 3, the disease had invaded the genio-hyoglossus muscle of the apparently unaffected side, and had almost destroyed it. In fact, disease had spread over the middle line, where the medium raphé was most marked (*see* Fig. 3), and had respected the middle line, where no median raphé existed.

Deep Spread.—Fig. 5 is a section of a squamous epithelioma on the extreme edge at one side of the tongue. The spread is marked by the invasion of the most superficial muscle here, *viz.*, the styloglossus muscle.

Fig. 6 is a longitudinal section of all the parts removed by a Whitehead's excision; it was cut obliquely downwards and outwards from the dorsal surface of the tongue, so that the section was parallel with the fibres of the hyoglossus muscle. The cancer was situated more towards the centre than that of Fig. 5, but still well on one side of the tongue. The disease can be seen spreading downwards in the substance of the hyoglossus muscle. This is one of the three cases which died, and quite a large secondary deposit was found in the stump of the hyoglossus muscle, which had been left behind.

The hyoglossus muscle has a most extensive relation to the mucous membrane of the tongue. It lies immediately beneath the mucous membrane on the dorsal surface over the whole of its anterior two-thirds, and hence is the first muscle to become invaded, and invaded almost immediately in cancer of this region of the tongue. Fig. 7 shows some muscle fibres on the dorsal surface of the tongue actually being inserted in and among the surface epithelium; the association is not always so close. Fig. 8 represents a common appearance, and the interval between the muscular and epithelial layers is often even wider. But had cancer occurred in the epithelium, in a case like Fig. 7, the first

division of the cancerous cells would have invaded the underlying hyoglossus muscle.

Fig. 9 is a drawing of the macroscopic appearances of the hyoglossus muscle of another case, in which this muscle was invaded up to the edge of the removed parts. At the post-mortem examination, there was also a secondary deposit in the stump of the hyoglossus muscle, just above its attachment to the hyoid bone, which consequently had been left behind by the operator.

At this point I must make an exception, and describe a secondary deposit in a lymphatic gland, which occurs in the earliest stages of cancer on the side of the tongue, and in one of my cases, it was the only lymphatic gland which contained cancer. The lymphatic gland in question frequently lies on, or near, the posterior inferior angle of the hyoglossus muscle just above the hyoid bone. In the case to which I now refer, it was not only the sole lymphatic gland affected, but the cancer had spread from the gland to the underlying hyoglossus muscle, to which it was slightly adherent, so that it would have been impossible to remove the cancer, unless the hyoglossus muscle was removed as well, so this was done.

Figs. 10 and 11 show the macroscopic and microscopic appearances respectively, and, in separate cases of cancer invading the genio-hyoglossus, in such a manner, that there is no mistaking the intention of the growth to spread in the fibres of this muscle, and pick them out, in the same way, that the disease has picked out the hyoglossus muscle in Figs. 6 and 9. The limitation is marked. In the three post-mortem examinations no disease existed in the genio-hyoid fibres of the genio-hyoglossus muscle, although there was extensive invasion of its genio-glossal fibres. The actual attachment of this muscle to the lower jaw also escaped invasion in the three cases.

In the most advanced case of this series, there was a secondary deposit in the inferior lingualis muscle, near its attachment to the hyoid bone, which had of course been left behind at the time the tongue was removed. There can be no doubt that the *primary* growth in cancer of the tongue spreads in the muscles, rather than in fascial planes, which separate them. The secondary deposits occur in the muscles and fascial planes.

PLATE XXVII.

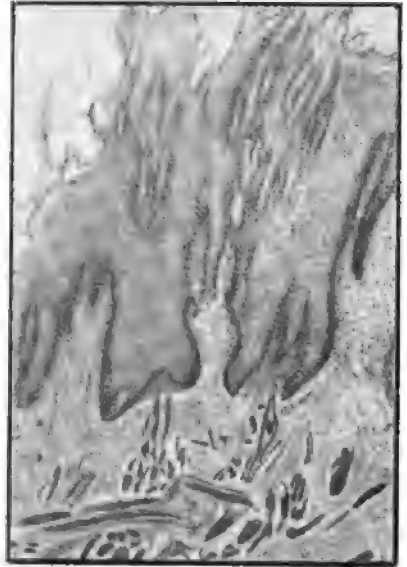
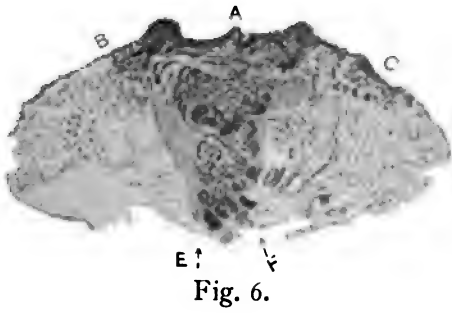


Fig. 7.



Fig. 8.

PLATE XXVIII.

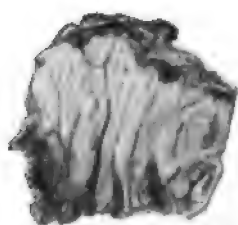


Fig. 9.

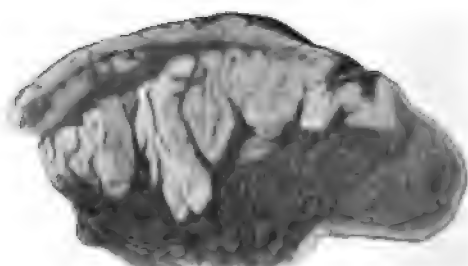


Fig. 10.

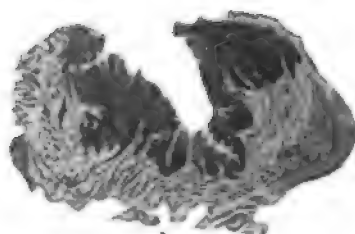


Fig. 11.

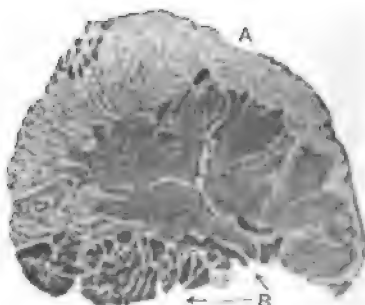


Fig. 12.

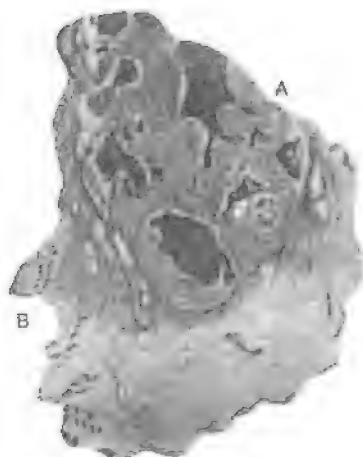


Fig. 13.

{There is one case in the series which I particularly wish to isolate for description, that is the spread of the cancer, which began on the under surface of the tip of the tongue at the attachment of the *frænum linguæ*, and which had just invaded the floor of the mouth, but where the main invasion had entered the under surface of the tongue, and was greatest in the genio-glossal fibres of the *genio-hyoglossi*, *see* Fig. 12. Invasion of the inferior lingualis muscle and *hyoglossus* muscle of both sides had also recently occurred. But the mucous membrane on the dorsal surface of the tongue had escaped.

For the first time in this series, the *genio-hyoid* muscle came prominently forward as a structure to be dealt with. The fascia covering it contained secondary deposits, *see* Fig 13, and it will be seen that the deposit was so close to the actual muscle fibres, that the excision of the muscle was the only trustworthy method of removing the cancer deposit, which had been left behind in the removal of the tongue. The part of the *palato-glossus* muscle in the tongue was not affected in any case.

Now come the questions, what is the practical result of this investigation? and how does it influence a surgeon in the choice of an operation for the removal of the tongue, in this, which I have termed the second class of case?

It seems to demonstrate, beyond any possibility of doubt, that Whitehead's method of excision is quite inadequate and unscientific for the second class of case. In these cases, I have shown that secondary deposits were found in the stumps of the *hyoglossus* muscle, the inferior lingualis muscles, and in the fascia covering the *genio-hyoid* muscles. In these death occurred within eight days after excision by Whitehead's method. In the tissues, removed, by this method, from those cases which did not die, the disease had actually reached, or was so near the cut edges of them, as to render it practically certain that disease had been left behind, and that the operation had better have been left undone.

In this second class of case, there can be no doubt that when disease has spread to the dorsal surface, at, or near the centre in its anterior two-thirds, the *hyoglossus*, the *genio-hyoglossus* muscles, particularly its *genio-glossal* fibres and

the inferior lingualis muscle, are cancer bearing on both sides, and their total removal is the best chance of success.

When the disease has begun, and is still undoubtedly quite at one side, and does not approach the middle line, then excision of half the tongue and of its muscles should be attempted, but I believe those cases, in this second class, in which half the tongue and its muscles can be removed, with assurance that no cancer will be left behind in the opposite side, are decidedly uncommon. Whether one complete half, or both sides, of the tongue have been removed, the glands in the anterior triangles of both sides must be cleared, as advised by Mr. Butlin, *B.M.J.*, February 11, 1905. The whole tongue, and its muscles must also be removed in the second class of cases, where the disease involves the under surfaces of the tip and floor of the mouth, and the genio-hyoid muscles and their fasciæ must also be taken away. These operations are so serious and radical, in their completeness, that one may well pause to seriously consider whether, after all, many and indeed most of the cases which belong to this second class are not really inoperable. Although they are now regarded as operable, I say that they are inoperable, unless the removal is more radical and extensive than is now practised, but there can be no doubt that the operation for the removal of their tissues is of so grave a nature, as to make me hesitate, before attacking cases, which are so much on the borderland, which separates the operable from the inoperable.

I have done three such cases, two in which half the tongue and its muscles were totally removed, and the anterior triangle was cleared of glands. They healed well, and the patients are now at work. The other case was the removal of the tongue and its muscles on both sides for a cancer near the middle line on the dorsum in its anterior two-thirds, but death occurred within eight days from septic pneumonia. The removal of cancer was complete, so far as we could estimate, from many sections cut of the genio-hyoid, mylo-hyoid, and anterior belly of the digastric muscles. It is well recognised that sepsis is the greatest danger to this operation, a danger that may be controlled, when more is known as to which are the more constant micro-organisms which induce post-operative infection in these parts.

In my cases, I considered the question of the pre-operative

administration of antistreptococcus serum, but negated it on the ground that, in my experience, it is useless, and although I have never seen any harm result from its employment, there are theoretical and experimental reasons for assuming that it may be deleterious, and that its ingredients may consist of more toxic than beneficial elements. The question was also considered of inducing pre-operative artificial immunity by Dr. Wright's method, and of operating, when the degree of opsonic power tested by Wright's method was high. This I decided to try, and it was done, for me, in two cases by Dr. Emery. In the first case, the opsonic power was increased for pneumococcus and staphylococcus aureus. The second case for staphylococcus only. The micro-organism, found in the wound of the first case, was the staphylococcus only, and curiously enough the cocci were all intracellular. There were no complications in the two cases treated in this way, and the temperature remained normal throughout. This is certainly the line to be taken in future, and although the staphylococcus aureus was the only micro-organism, found in the wounds of the two cases of mine, I must say that, at present, our knowledge as to which are the actual micro-organisms, that are likely to be the infecting agents, is not sufficiently accurate, and, for all we know, it may be necessary to render the patient artificially immune against one, two, or more micro-organisms, before operation can be undertaken, with certainty of safety.

Finally, I may say a few words on the stages of the operations which I performed.

Great care was taken to thoroughly cleanse the mouth, by the removal of all teeth stumps, and by brushing and scraping the remaining teeth for three days before operation, and during the operations great attention was paid to handling the cancerous parts without squeezing them for fear of dislocating the cells of the tumour. The incisions I made for the unilateral operation were two. (1) Was carried along the anterior border of the sterno-mastoid from the tip of the mastoid process to the level of the hyoid bone from which point it was continued transversely across the neck to the middle line, and thence upwards to the symphysis of the inferior maxilla. (2) Was a continuation of the first part of the first incision, and was carried along the anterior border of the sterno-mastoid as far as the sixth cervical vertebra; this

incision was made after the tongue and its muscles and lymphatic glands were removed, and after a change of rubber gloves, when the chain of lymphatic glands, in this part of the anterior triangle, was excised. After the first incision, the resulting flap was turned up. The submaxillary salivary gland and lymphatic glands of the neck were removed. The lingual artery and vein were ligatured, cut, and finally removed with the tongue muscles. There can be no doubt as to the necessity for the removal, without disturbance, of the lingual artery and vein, together with their lymphatic vessels with which they are accompanied. The hypo-glossal nerve was isolated, the mylo-hyoid muscle, with the anterior belly of the digastric muscle, was pulled forward, and the posterior belly of the digastric muscle and stylo-hyoid muscles was pulled downward and backward. The stylo-glossus muscle was cut as far backwards as possible.

The attachment of the hyoglossus muscle to the hyoid bone was cut, and the hyoid bone attachments of the genio-hyoglossus and inferior lingualis muscles, which are here difficult and unnecessary to differentiate. If possible, the branch from the hypo-glossal nerve to the genio-hyoid muscle should be saved. The branch to the genio-hyoid muscle leaves the convexity of the curve of the hypo-glossal nerve at the centre of the hyoglossus muscle on which it lies. The rest of the branches of the nerve were cut away from their attachments to the tongue muscles. The operation was completed from the mouth, as in Whitehead's operation. The operation, performed on both sides, was a repetition of these procedures, except that at the end of the operation, the skin incision represented the appearance of the letter H, the horizontal limb of which extended across the neck at the level of the hyoid bone, and the two vertical incisions extended along the anterior borders of the sterno-mastoid muscles from the tips of the mastoid processes to the level of the sixth cervical vertebra. Needless to say, the flap in the upper quadrant of the H was turned up. In the end of this operation, the hyoid bone was attached to the lower jaw by the two genio-hyoid muscles, the mylo-hyoid muscles, and anterior bellies of the two digastric muscles.

The edges of the wounds were controlled by a few interrupted stitches, and large drainage tubes were inserted.

I have said above that Whitehead's method of excision is quite inadequate in cases which I have described as belonging to the second class. In cases, which I have described as belonging to the first class, I have found secondary deposits in the hyoglossus muscle, more particularly among those cases, in which the cancers were situated on the edges, or under surfaces, of the sides of the tongues. The removal of these secondary deposits by Whitehead's method was so great a matter of chance, that, even in the earliest cases, viz., those I have described as belonging to the first class, I now remove the hyoglossus from the hyoid bone in all cases of this class, and in some the hyoglossus muscle, as well.

Description of Plates.

Fig. 1.—A microscopic section made at an edge of a squamous epithelium (*D.*) of the tongue.

At *A.*, *B.*, *C.* is the mucous membrane.

At *A.* the epithelium is undergoing hypertrophy.

At *B.* it is undergoing atrophy.

At *C.* one of two things is occurring, either the subjacent cancer (*D.*) is extending to the surface epithelium, or the previously normal surface epithelium is supplying additional cells to the underlying tumour. There are heterotype mitoses at *C.* and in the mucous membrane between *B.* and *C.*

Fig. 2.—A microscopic section of squamous epithelioma of the tongue. Below *A.* the mucous membrane is undergoing atrophy. Below which is a layer of chronic inflammation, in which are a few scattered cells of the squamous epithelioma, which is seen approaching the surface from below.

The surface epithelium on the side of *A.* is not undergoing change.

Fig. 3.—A photograph of a tongue in which is seen a constantly occurring type of distribution in squamous epithelioma of the tongue; one side is punched out, except at the tip *A.*

Fig. 4.—A transverse microscopic section of a normal tongue. The median raphé cannot be traced to the submucous tissue in this specimen, in which it is lost in the intrinsic muscles of the tongue.

Fig. 5.—A longitudinal microscopic section of the styloglossus muscle *B.*, in which is spreading a squamous epithelioma

A., which began in the mucous membrane at the extreme edge of the tongue in its anterior two-thirds.

Fig. 6.—A longitudinal microscopic section of the whole tongue, which was excised by Whitehead's method. The abrupt margins of a squamous epithelium can be seen on both sides of *A.*, and the tumour is spreading downwards in the hyoglossus muscle, which is entirely contained between the letters *E.*, *F.* Below the mucous membrane at *B.* and *C.* are mucous glands and no cancer cells.

Fig. 7.—A microscopic section of the mucous membrane of a tongue made on the dorsal surface at the centre of the anterior two-thirds. The muscle-fibres, subjacent to the mucous membrane, can be seen actually inserted among the surface epithelial cells.

Fig. 8.—A microscopic section of the mucous membrane made on the dorsal surface at the tip of the tongue. The subjacent muscle-fibres reach, and enter, the submucous tissue, but do not touch the epithelial cells as in Fig. 7.

Fig. 9.—A longitudinal microscopic section of the tongue, showing the invasion of squamous epithelioma (light) in the hyoglossus muscle (dark). The cancer has reached the edge *A.* of the parts removed by Whitehead's method.

Fig. 10.—A longitudinal microscopic section of the tongue, showing the distribution of squamous epithelioma (light) in the genio-hyoglossus muscle (dark). The muscle lies between letters *A.*, *B.*

Fig. 11.—A longitudinal microscopic section of the whole tongue from another case. The genio-hyoglossus muscle can be seen to contain, and form, the limits of a squamous epithelium, which has deeply ulcerated the muscle.

Fig. 12.—A longitudinal microscopic section of tongue and sublingual gland, showing the distribution of squamous epithelioma, which has spread into the genio-hyoglossus muscle from the under surface of the tongue and floor of the mouth. The arrow on the right of *B.* points to the cancer, that on the left to the sublingual gland.

Fig. 13.—A microscopic section, showing a secondary deposit of squamous epithelioma *A.* in the fascia covering the genio-hyoid muscle *B.*



THE PATHOLOGY OF DROPSY.

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FEW problems have presented greater difficulties to the pathologist than that of the causation of dropsy; and the character and importance of the factors, concerned in its production, are not yet fully understood. During the last few years, however, many investigations have been made, not only as regards normal lymph formation, but also as to the pathological conditions underlying the occurrence of oedema. In this paper, a brief summary will be given of the main results obtained in recent years, and an attempt will be made to point out their bearing on the origin of dropsy, as it occurs in man.

I.—PHYSIOLOGICAL LYMPH FORMATION.

Professor Starling has laid down the axiom that the factors, concerned with normal lymph formation, are also at work in the production of dropsy. It will be convenient, therefore, to consider the physiological aspect of the question as a preliminary to the study of oedema arising under pathological conditions. The lymph acts as a sort of middleman between the blood and the tissues, supplying nutriment to, and removing waste products from the latter; and its formation may be considered in relation to the vascular system on the one hand, or to the tissues, on the other hand. The influence of vascular changes on the amount and characters of the lymph has been the subject of almost numberless investigations, which need not be described in detail. The pendulum has swung now to the view, that lymph is a product of secretory activity on the part of the capillary endothelium, now to the conclusion, that it is formed almost exclusively by physical processes, such as osmosis, filtration, and diffusion. The physical view has been strongly advocated by Cohnstein and Starling, and the latter holds that the formation of lymph normally depends upon two factors, namely, the intracapillary pressure and the permeability of the capillary wall. Although Starling's conclusions

are widely accepted, they have been challenged by many observers, among whom Asher has recently taken a prominent position. Asher believes that changes in capillary pressure and permeability have very little to do with lymph formation. He has carried out a large number of experiments to show that these physical factors do not modify the flow of lymph; but only a few of them can be described here. He found that reflex excitation of the salivary glands, after the administration of atropin, although it increased the blood flow and capillary pressure in the glands, had no influence on the flow of lymph. More recently, he has published some very striking experiments on the flow of lymph after death. It is well known that the flow of lymph from the thoracic duct continues for some time after the death of the animal. Asher injected a concentrated sugar solution intravenously into a dog, and immediately killed it. The lymph flow, which had been proceeding at the rate of 4 c.c. in ten minutes during life, rose to 37 c.c. in ten minutes shortly after the dog had been killed; two hours later, the rate of flow was still 4 c.c. in ten minutes. Such a result seems, at the first glance, entirely to dispose of the view that the formation of lymph varies directly with the capillary pressure, since at death, the arterial pressure falls nearly to zero. And Asher regards the concurrent post-mortem increase in the secretion of saliva, pancreatic juice, etc. as the probable source of this flow of lymph. Unfortunately, he omitted to record the pressure in the vena cava and portal vein for some time after death. Until such observations have been made, his conclusions cannot be accepted. For, after death, the blood pressure becomes uniform in all the vessels of the body, and this mean pressure is normally about 10 m.m. Hg. But the injection of a hypertonic sugar solution sets up osmotic changes, whereby the volume of the blood is greatly increased; and this will still take place after the death of the animal. As a result, the total mass of the blood, in relation to the capacity of the vascular system, will become very large, and the mean blood-pressure will be correspondingly increased. The capillary pressure after death will, therefore, be unusually high, and there will be an excessive transudation of lymph, so that, on analysis, the experiment is seen to support, rather than to oppose, Starling's views.

The experiments of Hooker and Mendel, who obtained a prolonged post-mortem flow of lymph, after injecting strawberry extract, can be explained in the same way. The action of strawberry extract is similar to that of peptone. Recent research, therefore, has not invalidated the doctrine, that raised capillary pressure increases the formation of lymph. Under normal conditions, the permeability of the capillaries is regarded as constant ; at any rate, nothing is known concerning physiological variations. The undoubted alterations, occurring in disease, will be considered subsequently.

The Tissues in Relation to Lymph Formation.—It is remarkable that the relation of the tissues to lymph formation should so long have escaped recognition, since the passage of food and waste products from one to the other is continuously taking place. Although Heidenhain had suggested that the exchange of food and metabolites was effected by a process of diffusion, the influence of metabolic changes in the tissues on the character and amount of lymph was first pointed out by Hamburger, who supposes that the products of tissue-metabolism stimulate the capillary endothelium to increased secretion of *dilute* lymph.

The most important contributions to our knowledge of the subject are those of Asher and his co-workers. He holds, firstly, that metabolic activity of any organ invariably increases the flow of lymph from that organ ; secondly, that the lymph is formed by the organ itself, and is *secreted* by the tissue ; thirdly, that lymph formation is independent of physical factors, such as capillary pressure or permeability, except in so far as an altered blood supply assists the metabolic activity of a tissue. Before discussing Asher's views, some account of his experimental work may be given. In the case of the secretory glands, the amount of secretion may be used as an index of the metabolic activity of the gland. Taking the salivary glands, Asher found that the secretion of saliva was accompanied by an increased flow of lymph from the gland ; the injection of atropin abolished the flow of saliva, and the lymph was no longer increased in amount. The correspondence between secretory activity and lymph formation was still more clearly demonstrated in the case of the liver, in which the injection of bile, or hæmolytic substances, increased the secretion of bile by the

liver, and at the same time increased the flow of lymph. I have confirmed these observations on the submaxillary gland and liver. The arterial and venous pressures were recorded in the case of the liver, and it was found that the careful injection of bile salt had no influence on the arterial or vena cava pressure, and that the rise in portal pressure was very slight. Precautions were also taken to avoid hydræmic plethora. The increased lymph flow, therefore, was not due to increased capillary pressure, and there is no doubt that metabolic activity of the liver (and other glands) is the cause of an increased formation of lymph. On the other hand, Falloise has raised objections to this statement. He made observations on the relation of pancreatic secretion to the lymph flow, and asserted that by using "secretin," freed from depressor substance, he obtained a flow of pancreatic juice without any increased flow of lymph. My own experiments, however, show that the secretion of pancreatic juice is invariably accompanied by an increased flow of lymph, so that the pancreas falls into line with the other secretory glands.

Much of Asher's work has been devoted to the investigation of Heidenhain's first class of lymphagogues—peptone, leech extract, and so on. These bodies were regarded by Heidenhain as stimulating secretion by the capillary endothelium, since their injection yields an increased flow of concentrated lymph. Starling showed that the injection caused a large rise in portal and vena cava pressure, and that the lymph was derived entirely from the liver. Since the increased flow of lymph lasted after the blood-pressures had again fallen to normal, he invoked increased permeability of the capillary wall as the cause of the lymph flow, and concluded that peptone damaged the liver capillaries. In accordance with his general theory, Asher holds that peptone and similar bodies act not on the capillaries, but on the liver cells. He maintains that they are cholagogues, and that the increased flow of lymph is bound up with the liver activity involved in the secretion of bile. Both Ellinger and myself have failed, however, to obtain any secretion of bile after injecting peptone; and Asher himself frequently obtained negative results. Nevertheless, there is no doubt that peptone acts upon the liver cells, for Kusmine has observed histological changes in the liver after injecting peptone. The most definite effect is the rapid disappearance of glycogen; the cells also lose

their sharpness of outline, and stain more deeply than before. These alterations show that the first class of lymphagogues act partly by provoking metabolic changes in the liver. But the changes in the liver produced by peptone—changes which border on the pathological—render it very probable that peptone also injuriously affects the capillary endothelium, and increases its permeability. The exact share taken by these two factors in the lymph flow, brought about by peptone, cannot be determined.

Although a study of the experimental evidence makes it clear that metabolic activity of the tissues is a cause of the formation of lymph, it is equally obvious that such a mode of production in no way excludes the possibility of its formation by altered relations between the blood and the lymph. The two are quite compatible; Asher's observations do not really touch the conclusions of Starling and Cohnstein, and certainly do not justify him in relegating to the background mechanical factors.

As to the way in which metabolic activity increases the formation of lymph, Asher believes that the lymph is a secretion of the tissues, analogous, for example, to the secretion of saliva.

On the other hand, Starling pointed out that all katabolic changes in the tissues tend to increase the osmotic pressure of the lymph in which they are bathed. The same idea has been elaborated by Koranyi and Roth.

They consider that during cell activity, substances of small molecular weight are formed, which increase the osmotic pressure within the cells. These bodies are carried by diffusion into the tissue spaces, and increase the osmotic pressure of the tissue fluids. Water is thereby attracted from the blood into the tissue spaces, and the metabolites gradually diffuse into the blood, so that eventually equilibrium is restored. The extra lymph, entering the tissue spaces, gives rise to the observed lymph-flow. In the case of the muscles, direct experimental evidence for this view has been brought forward by Morley Fletcher, and will be considered subsequently. Such an explanation, moreover, fully accounts for the observed facts as to the influence of tissue-activity (metabolism) on lymph formation. It is essential to the truth of the conception of

Koranyi and Roth that the lymph, leaving an organ, which is in a state of activity, should be more *dilute* than when the organ is at rest ; and this has been shown to be the case in Hamburger's experiments on the lymph-flow from the neck of the horse during a meal, and my own experiments on the lymph-flow from the liver accompanying biliary secretion. Further investigations on this point, however, are much to be desired.

The main results of physiological work on lymph formation of recent years may be summed up as follows :—Firstly, the mechanical explanation advocated by Starling and Cohnstein still holds its ground, although there is a growing tendency to attach more importance to vital alterations in the capillary endothelium than is done by these writers.

Secondly, the outcome of the work of Asher and others has been the establishment of the fact that tissue activity invariably increases lymph production ; the lymph is probably formed by a process of osmosis, and diffusion, and is more dilute than that from a resting organ.

II.—DROPSY.

There is no doubt that several factors are always concerned in the production of œdema, when it occurs. This was pointed out by Cohnstein, and has been abundantly confirmed. Until quite recently, however, it has not proved possible to produce experimentally either cardiac, or renal, dropsy ; and for that reason, the analysis of the nature and relative importance of the various processes, which give rise to œdema, has been greatly hampered. But the production of cardiac dropsy in animals has at last been effected, and much new light has, of late, been thrown on the causation of renal dropsy.

Broadly speaking, cardiac dropsy is the result of disturbed relations between the vascular system and the lymph, whereas renal dropsy is primarily the outcome of changes in the relation of the tissues to the lymph ; the former may be first considered, as it presents the fewest difficulties.

Cardiac Dropsy.—The causation of cardiac dropsy was very fully dealt with by Starling in the Arris and Gale lectures in .896, and any account of the subject must consist chiefly of criticism of the views put forward in those lectures. Cohnstein,

of course, had long ago emphasised the importance of increased venous pressure in combination with increased permeability of the capillary wall. To these, Starling adds other subsidiary factors.

Before discussing his views, however, it is advisable to say something with regard to the absorption of fluid from the tissue-spaces and serous cavities. This is undoubtedly carried out mainly by the blood-vessels, and only to a small extent by the lymphatics. According to Starling, the essential factor, which determines absorption, is the osmotic pressure of proteid, and there is normally a very accurate balance between filtration and absorption. The height of the capillary pressure determines the rate of the transudation of lymph, and the excess of proteid in blood, as compared with lymph, regulates the amount of fluid absorbed from the lymph into the blood. A rise of capillary pressure increases the filtration of fluid, and raises the percentage of proteid in the blood, thereby increasing the tendency to absorption of fluid. In this way the balance is maintained, and the formation of lymph is kept at a constant level. This conception plays an important part in Starling's theory of cardiac dropsy. Quite recently, Waymouth Reid has shown that proteids, if completely freed from adherent substances (probably proteid metabolites), have no osmotic pressure at all. It appears, however, that these metabolites are in very intimate relation to the proteid molecule, even within the body; so that an osmotic difference of pressure probably does exist between blood and lymph, though it is due not to the proteid but to adherent substances. Starling's view as to the causation of cardiac dropsy may be stated as follows :—

First, in an uncompensated heart, there is a fall of arterial pressure, and a rise of venous pressure near the heart. There is also a fall of capillary pressure, in consequence of the fall of arterial pressure, in the kidney, intestines, and peripheral parts of the body. The fall of capillary pressure lessens filtration, and for a time upsets the balance between filtration and absorption; consequently an excess of fluid is absorbed by the blood-vessels from the intestines and peripheral tissues.

Secondly, this continued absorption associated with the diminished urinary secretion, leads to hydræmic plethora, and increases the mean systemic pressure.

Thirdly, this hydræmic plethora raises the capillary pressure all over the body, and promotes increased filtration, the more so because the venous state of the blood damages the capillaries, and increases their permeability. A further subsidiary factor is the obstruction to the entrance of lymph into the great veins at the thoracic duct owing to the excessive venous pressure.

The factors, then, of chief importance are hydræmic plethora followed by filtration. A difficulty in accepting this conclusion is that hydræmic plethora, experimentally produced, does not cause oedema, unless the capillaries are damaged as well. Nevertheless, examination of the blood shows that, in the early stages of cardiac dropsy, hydræmic plethora occurs, although it disappears later.

However, a more serious criticism of Starling's views comes from another direction. Bolton has succeeded in producing cardiac oedema experimentally. Portions of the pericardial sac were tied off, so that the residue of the pericardium was, so to speak, too small for the heart; it prevented full expansion of the heart, and thereby interfered with the entrance of blood into the heart, and caused distension of the big veins. Bolton found that at first the arterial pressure fell, and the venous pressure rose; the latter, however, soon returned to the normal, while the arterial pressure remained low. If the animal were allowed to live for some days, dropsy of the head, the chest wall, and the peritoneal cavity occurred; there were also dyspnoea, albuminuria, and scanty urine. After a few days, the venous pressure was normal, and the arterial pressure slightly, but not much below the normal. The capillary pressure, therefore, would be a little below the normal. Bolton concludes that changes in the permeability of the capillary wall form the most important factor in the production of cardiac dropsy, since the veins adjust themselves to the accumulation of blood within them, and the venous pressure is not greatly raised.

By means of the Riva-Rocci apparatus, or one of its many modifications, the arterial pressure in man can now be measured. The use of this apparatus shows that in cardiac disease, with loss of compensation and dropsy, the arterial pressure remains practically at the normal level, except in very severe cases, in which the fall of pressure is an ominous or fatal sign.

Although in uncompensated heart disease the arterial system contains much less blood than normal, the arterial pressure is maintained by the vaso-motor centre, whereby the capacity of the vessels is adjusted to the lessened output of the heart. There seems, therefore, to be no sufficient cause for the occurrence of hydræmic plethora in heart disease.

Apparently, as Bolton shows, the veins also become adapted to the accumulation of blood within them, so that neither the arterial, nor the venous, pressure is altered to any great extent. It is probable, however, that in cardiac disease in man, there is some rise of venous and capillary pressure all over the body ; the result will be an increased filtration of fluid, which will naturally be most obvious in the dependent parts of the body. Nevertheless, the experiments just described indicate that increased permeability of the capillaries, rather than a rise of capillary pressure, is the more important factor at work. This altered permeability is brought about by deficient oxygenation of the blood and impaired nutrition of the capillary wall.

In so far as the lack of oxygen interferes with the nutrition of the tissues, katabolic changes will become more prominent, metabolites will accumulate in the tissues, and diffuse into the tissue spaces, and, as a result, the formation of lymph will be increased. Lazarus-Barlow attaches very great significance to this factor, which he regards as the chief cause of cardiac dropsy. But the direct evidence for this view is rather scanty, and one may conclude that the essential causes of cardiac dropsy are the changes in the vessels already considered, and that alterations in the tissues are of minor importance.

(To be Concluded.)



THE CAUSES, SYMPTOMS, AND TREATMENT OF PYLORIC OBSTRUCTION.

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PYLORIC obstruction may be held to include all those conditions which prevent the escape of the gastric contents into the general intestinal tract, where they should be further digested and absorbed, for the use of the tissues generally. Pyloric obstruction, therefore, as a clinical term, is not confined absolutely to constriction at the pylorus, but includes the pyloric end of the stomach on one side, and at least the first part of the duodenum upon the other.

There are many causes of pyloric obstruction, and no period of life is exempt. Everyone who has had much experience in the treatment of the diseases of children knows that they are liable to several forms of pyloric obstruction. It is sometimes truly congenital, and is produced by a more or less complete septum stretching across the intestine at, or near, the point where the common bile-duct opens into the duodenum. The following is a good instance of such obstruction in its most extreme form. A child was born, after an easy labour, on 16th June, when it weighed 7 lbs. 13 ozs. It began to vomit an hour or two after birth, the vomiting was profuse, and a slightly yellow, watery fluid was brought up. The vomiting continued until death, on June 21st. The child was obviously suffering from some form of intestinal obstruction, for it was jaundiced, and coils of intestine were seen writhing through the abdominal walls. Meconium was passed, however, and the rectum, which held at least 4 ozs., was free from any obstruction. The pain was severe, and was at last relieved by laudanum, of which more than a drachm was given, in small doses during the last 24 hours of its life. The question of an exploratory operation was raised, but it was decided to do nothing, and I did not see the child until after death. The post-mortem examination showed that the stomach was well-formed, and measured 8 inches along its greater curvature.

It was healthy in every respect, and a microscopical section showed that it had not been injured in spite of the great distension it had undergone. The pylorus was marked by a thickened ring, and, immediately beyond it, the first and second parts of the duodenum were distended into a large sac. The dilated portion tapered off into a funnel-shaped third portion. The dilated duodenum was bile-stained along its anterior third, and it formed a large and thin-walled sac, measuring $6\frac{1}{2}$ inches along its convex border. The sac was thrown into a series of folds, owing to the irregular contraction of the peritoneal attachment to its upper border. The third part of the duodenum formed a sharp kink or "knee" with the distended part, and through this kink no fluid could be forced by moderate pressure. When the sac was laid open, after it had been hardened in spirit, it was clear that the lumen of the intestine was completely interrupted by a septum, stretching across it at a point immediately upon the stomach side of the middle of the second part duodenum. The anatomical position of the septum was fixed very accurately, because the common bile-duct entered the intestine just beyond it. A microscopical examination of the septum, showed it to be a direct continuation of the mucous, sub-mucous, and circular coats of the bowel. The longitudinal layer of muscle took no part in its formation, except to send off a slight slip which soon became lost. The septum was covered on either side with mucous membrane, provided with normal villi and crypts of Lieberkühn. The sub-mucous coat was very vascular, and was provided throughout with a thick layer of muscularis mucosæ. The muscle was a continuation of the circular muscular coat of the intestine. It was very thick at the side of the septum, and thinned off gradually towards its centre, until it became broken up into a number of strands, lying parallel to each other, and separated by layers of connective tissue. The jejunum was contracted and contained meconium. The rest of the intestine and the various abdominal organs appeared to be healthy and normal, except that the free edge of the left lobe of the liver was so firmly bound down by a fold of peritoneum, that the organ was torn in its removal. There is no doubt that, if the child had survived the shock of the operation, a gastro-enterostomy would have cured it.

Children are liable to at least two other forms of pyloric obstruction, the one a stenosis, without thickening of the pylorus; the other a true congenital hypertrophy of the circular muscle, in which the pylorus can be felt during life through the abdominal walls. The symptoms are characteristic of this form of obstruction. The child is well nourished at birth, because it has not had to depend upon its own powers of digestion, but within a short time it begins to pine. It vomits repeatedly, at once if a large feed be given, at longer intervals, if the quantity ingested is limited in amount. Constipation is often a marked feature, and sometimes the stomach is greatly dilated, its exaggerated movements being visible through the abdominal walls. Death usually occurs from starvation within the first six months of birth, though a few cases have been saved by gastro-enterostomy. Dr. Edmund Cautley points out that the vomiting in these cases is distinguished from the ordinary vomiting of babies, by the facts that it is more forcible than painful, and that it depends more on the amount, than on the nature, of the food. An examination of the stomach in cases of congenital hypertrophy of the pylorus shows that the thickening is most pronounced on the duodenal side of the orifice, and that it tapers off on the cardiac side. It is due almost entirely to an excess of the circular muscle, but, associated with it, there is considerable thickening of the mucous membrane, which is often thrown into thick ridge-like folds that contribute materially to the pyloric stenosis.

But, if very young children are not exempt from pyloric obstruction, older people are much more commonly affected, and from a greater variety of causes. The obstruction may sometimes be traced directly to the action of irritants, as in the following case of corrosive poisoning:—

A builder's timekeeper was admitted into St. Bartholomew's Hospital in March 1903, saying that on New Year's Eve he had swallowed about an ounce and a half of strong nitric acid. He vomited five times and was taken to the German Hospital, where he remained eight days and was then discharged, apparently cured, for he had no difficulty in swallowing. On January 25th he vomited after a dinner of pork, and from that day forwards, until he came under my care, he vomited daily and often twice a day, always with great pain in his epigas-

trium. The pain reached a maximum about two hours after food, whilst the vomiting, which took place at first directly after food, gradually increased its interval, until, when I saw him, it did not occur until an hour or two after his meals. He never vomited bile, nor was there any blood. The patient was a spare man, with a dilated stomach and thickened pylorus, who was obstinately constipated.

I performed a pre-colic gastro-jejunostomy through a median incision on March 10th. The stomach was found to be congested and the pylorus thickened. He bore the operation well, and was not sick afterwards. Recovery was uneventful, and he left the hospital on April 22nd, having been free from pain and without any return of the vomiting until April 15th. He complained on that day of some pain after food, but this was relieved at once by giving him minced meat, and forbidding him to eat potatoes and bread. There was no further return of pain during his stay in the hospital. Twenty months after the operation, he wrote that he had sometimes had slight attacks of pain and vomiting, which began about two months after the operation, but he had now been free from them for many months. He was able to eat and drink like other people, and could do an ordinary day's work in comfort. As we had asked for the cause and date of his death in a circular letter, addressed to his friends, he answered that he "feels like living very much," though, when he first came into the hospital, he used to say he did not care how soon he died, and that was why he drank nitric acid. I saw him a few months later, in midwinter, when he had drifted into the workhouse. He was still in good spirits, and said that he ate the workhouse fare with relish, digesting it at leisure and without a moment's discomfort.

This case is interesting because it shows how the stress of a corrosive poison may fall upon the pyloric end of the stomach, the œsophagus and cardiac end escaping any serious damage. Incidentally, it proves the value of gastro-jejunostomy, for in former times death occurred from inanition, and the stomach was usually found to be so extremely contracted in such cases, that if an attempt was made to perform a gastrotomy, as a last resource, there was serious danger of opening the duodenum.

Pyloric obstruction is sometimes caused by the cicatrisation of a chronic ulcer in the immediate neighbourhood of the pylorus. For some reason, as yet unknown, duodenal ulcers are more common in men than in women ; so marked is this peculiarity that, when I operate upon a man with symptoms of acute perforation of the stomach, I always look first at the pyloric end to find the ulcer, whilst in a woman I examine the cardiac end and the fundus before the pylorus. Pyloric obstruction from this cause, therefore, is more common in men than in women, and as the ulcer has not perforated, and the symptoms of duodenal ulceration are very ill-defined, the diagnosis is often obscure. Many of the patients have been allowed to die of starvation, in the belief that they were suffering from cancer of the stomach, for which no relief was possible. It is only recently, and in the course of palliative operations for gastric cancer, that this form of pyloric obstruction has forced itself on our notice, for the patients have been cured by gastro-jejunostomy, when the surgeon has only ventured to hold out a hope of temporary relief.

A patient, suffering from pyloric obstruction due to the cicatrisation of a duodenal ulcer, is generally a man of middle age. Thin and haggard, he tells you that he is a martyr to indigestion, and that for months past he has suffered from atrocious pain in his stomach, which is relieved by vomiting. The vomiting is worse at night, and is very abundant in quantity. He has dieted himself in every possible manner, he has visited all sorts of watering-places, and he has gone in vain from one physician to another seeking a cure by medicine. Examination shows him to be a mere bag of bones, badly constipated, with cold extremities, a listless, dejected aspect, and long past all business capacity. His abdomen is loose, the subcutaneous veins may be injected, and there is sometimes visible peristalsis from left to right in the epigastric region. Percussion shows the stomach to be greatly dilated, and it is not very unusual to feel a tumour in the neighbourhood of the pylorus. For a moment you think of cancer of the pylorus or gall-bladder, and you question the patient a little more closely. He is sure that he has been suffering for years, for so long, in fact, that he hardly recollects the beginning of his trouble. A few well-directed inquiries may elicit the fact

that he once brought up a large quantity of blood without serious pain or discomfort, or that he has sometimes had sudden attacks of faintness, after which he has noticed that his motions were of a much darker colour than usual. Occasionally, there is a history of some obscure abdominal attack, which was never properly diagnosed. He was treated for gall-stones, or for appendicitis, or simply for "liver." The attack was painful, more especially on the right side, and it kept him in bed, but the exact details have long since passed from his mind, and, for some years afterwards, he was as healthy a man as ever. Here is such a case in detail :—

A gentleman, aged 46, had suffered from dyspepsia for many years, and had a sudden hæmatemesis on 18th November 1902. He improved under medical treatment during 1903, but relapsed from time to time. The relapses became more frequent in 1904, and he was wholly unable to follow his occupation. He often vomited, the vomiting being worse at night. He had lost a great deal of flesh, and weighed only 8 stone 10 lbs.

I saw him first on 3rd April 1905, and found that his stomach was greatly dilated. There was a tender spot on deep pressure just to the right of the umbilicus, but no tumour could be felt, nor was there any perceptible thickening over the pylorus. The liver was of its natural size, and there were no gall-stones. I performed a post-colic gastro-jejunostomy upon him on 8th April. The stomach was dilated, the duodenum greatly constricted at a point 2 inches from the pylorus, and there were numerous adhesions round it. The operation was difficult on account of the great size and distension of the transverse colon, but the patient made a good recovery, and the wound healed by first intention. Convalescence was retarded by a sharp attack of phlebitis in the left leg. He was in the nursing home for five weeks, and reported himself on 19th June 1905 as weighing 9 stone 1 lb. He says that he can eat anything again. I found that his stomach was much diminished in size, though it had not quite regained its natural dimensions. On 15th August, his weight remained the same, his bowels were open naturally, and his stomach had returned to its natural size.

Pyloric obstruction is sometimes associated with gall-

stones, and this happens somewhat oftener in women than in men, for women are more prone to suffer from gall-stones, and often with quite incommensurate symptoms. A gall-stone may lie apparently for a long time in a gall-bladder without giving rise to much discomfort. It leads, however, to irritation, which in turn produces a localised peritonitis, causing adhesions which sometimes constrict the duodenum, and lead to the symptoms characteristic of pyloric obstruction. Such a case came under my notice in the early part of the year. A married woman aged 56 was admitted from a medical ward under my care at St. Bartholomew's Hospital on 4th January 1905, saying that she had been well until two months ago when she began to have pain after food. She got worse in spite of all medical treatment, and vomited whenever she ate anything. She felt pain under her heart about an hour after each meal, and the pain was relieved by vomiting. She has vomited blood twice, but has never noticed any *melæna*; her bowels as a rule are open every other day.

She ate a test meal of tea and toast on New Year's Eve, 1904, and her stomach was washed out two hours and a half afterwards. The analysis of the stomach contents showed the absence of free hydrochloric acid and of any organic acid or acid albumin, though the fluid was slightly acid to litmus paper. A little peptone was present with some starch granules, and many squamous and columnar cells, but there was no blood.

The stomach was greatly dilated, and reached far below the umbilicus. A blood count showed the presence of 3,186,000 red corpuscles and 4,000 white corpuscles in a cubic millimetre.

I performed a post-colic gastro-jejunostomy on 9th January 1905; the anæsthetic took seven minutes, the operation twenty-one minutes, and the dressing five minutes, so that the patient was on the table thirty-three minutes. The stomach was found to be greatly dilated, the duodenum was constricted by adhesions, which had been formed in connection with the gall-bladder, and the gall-bladder was thickened and shrunken. No new growth was discovered. The patient was not sick after the operation. She was fed upon nutrient enemata for the first thirty-six hours, and afterwards upon whey and peptonised milk. The wound healed by first intention, and she was discharged cured on 1st February, 1905. She reported herself

on March 3rd as one who had passed through a very severe attack of bronchitis. In spite of this, she felt better than before the operation, having neither pain after meals nor vomiting. Her weight was 7 stones 11 lbs., and the scar of the abdominal wound was sound. On August 15th, 1905, she again reported herself as being in perfect health, her weight had remained stationary, for several weeks past, at 8 stones 3 lbs., she was not suffering from the least abdominal discomfort, and her bowels were now open regularly and naturally. I had sections made of the piece of gastric mucous membrane removed at the time of the operation, and subsequent microscopical examination showed that it was infiltrated with polymorphonuclear leucocytes, which were probably the result of chronic inflammation. The glands were of the type usually found at the pyloric end of the stomach, and did not resemble those of the cardiac extremity, but they were remarkable because no oxyntic cells were present.

Here is another excellent case of a similar kind, for the notes of which I am indebted to Mr. Gerald T. Hughes, the resident medical officer at the Bolingbroke Hospital:—

E. F., a compositor, aged 62, was admitted to the Bolingbroke Hospital under my care on June 23, 1905, saying that for the last ten years he had suffered from flatulence and indigestion after food. The attacks had been intermittent, occurring about every six months, and lasting three to five weeks at a time. The pain was felt some three or four hours after food; nausea then supervened, and the patient occasionally vomited. He has never brought up any blood, nor has he noticed blood in his stools. He has never been jaundiced, and he has never had lead colic. The attacks have become worse lately, and, in January 1905, he was treated as an in-patient at the Bolingbroke Hospital. He improved under a restricted diet and after lavage of his stomach.

He was found on admission to be an anæmic-looking man. Examination of the abdomen revealed visible peristalsis, especially in the right iliac fossa, where a swelling is seen to appear and disappear. No tumour could be felt. A succussion splash could be obtained nearly to the pubes. The abdomen was resonant throughout.

I performed a posterior gastro-jejunostomy on June 24th.

The stomach was found to be greatly dilated. The duodenum near the pylorus was bound to the under surface of the liver in the region of the gall-bladder by numerous tough adhesions, evidently of long standing. There was no evidence of any malignant disease. The operation was prolonged on account of the great size and laxity of the transverse colon.

The patient rallied well from the operation, and for the first 32 hours he had nothing by the mouth, though a pint of saline solution was given as an enema every four hours. At the expiration of 32 hours, he had a drachm of peptonised milk and a drachm of albumin water alternately, the amount being cautiously increased. The patient left the hospital on July 20th. He was then taking his food well without any pain or flatulence; the wound had healed firmly and by first intention; his weight had risen from 7 stones 7 lbs. on the day of the operation to 7 stones 12 lbs.

The patient came to the hospital again on August 11th to report himself. He looked well, and said that he ate all his food heartily and without discomfort. His weight was 8 stones 4 lbs.

Lastly, there is cancer as a cause of pyloric obstruction, and cancer of the stomach is perhaps a little more common in men than in women. It does not necessarily occur only in those who are old in years, for I have seen it in comparatively young persons, and the symptoms are sometimes quite trivial at first. The following case shows how long a man with abdominal cancer may continue in ignorance of his condition :—

E. C., a stationmaster, aged 68, gouty and the subject of a left inguinal hernia for 19 years, was seized with a violent attack of sickness at the end of May 1905. During the last three months, he had found some difficulty in getting his bowels open, and he had felt pain occasionally in the left hypochondrium, the pain extending downwards towards the loin. The attack of sickness lasted two hours, and yielded to domestic remedies, so that he did not call in a doctor. It returned with increased severity on June 4th. During the first attack of sickness, his wife discovered accidentally that he had a lump in his abdomen.

The patient was a healthy looking man with a good colour. He had a large inguinal hernia on the left side, which was

partly reducible ; on the right side there was an inguinal gland enlarged to the size of a walnut, and the patient said that he had noticed this gland for the last five or six years, but did not think that it had increased in size. There was a large nodular tumour, in the left hypochondrium, which could be moved downwards towards the pelvis, and across the abdomen to the right of the middle line. The tumour was only slightly tender, and I diagnosed it as a mass of carcinoma involving the transverse colon near the splenic flexure. The examination and handling of the tumour set up symptoms of intestinal obstruction, and when these had subsided I explored the abdomen. I found, on June 9th, that the tumour was a mass of cancer involving the transverse colon, the upper part of the small intestine and the omentum. The constriction of the small intestine was much greater than that of the colon. I therefore performed a pre-colic gastro-enterostomy in such a manner as to throw out of action the affected part of the duodenum, and I freed the rest of the intestine so far as possible from the omental adhesions.

The patient rallied well from the operation, and seemed comfortable until June 14th, the fifth day, when he developed symptoms of strangulated hernia, of which he died on June 16th, without any signs of general peritonitis.

These cases show, I think, that the difficulties of diagnosis are often greater than the difficulties of surgical treatment in pyloric obstruction. The diagnostic difficulties are often self-made, because "dyspepsia" and "indigestion" are still words of such power, both to the physician and his patient, as to make them forget that they are merely terms for groups of symptoms. The dyspepsia, therefore, is too often treated, and the cause is overlooked. A physical examination to ascertain the condition of the abdomen and stomach has only been made in a few of the cases, which come under my notice. Serious mistakes are made for want of this precaution, and the patient has sometimes been put to an expense which is quite unnecessary. I recall two such instances within the last few months. One patient was dismissed with the information that he had "neuralgia of the stomach ;" a gastro-enterostomy has raised his weight from 8 stones to 12 stones. Another patient was sent to Egypt to receive benefit from the dryness of the

climate. He had a constriction, which reduced an inch of his duodenum to the size of a lead pencil, and a gastro-jejunostomy made a new man of him. The treatment of diseases of the stomach, at the present time, is passing through the same phases as has been undergone already by appendicitis and intestinal obstruction. Like these conditions, the slighter forms can be treated successfully by medicinal methods, for it is by no means desirable, or necessary, that every case should be submitted at once to a surgeon. But it is of the utmost importance that every medical man should know the limits of his art, and should distinguish, as quickly as possible, between the slighter cases, which can be cured by simple remedies, and those severe conditions which require more active measures.

Diet, the administration of bismuth, and the washing out of a dilated stomach are laudable and proper methods of treating the slighter form of pyloric obstruction on the general principles that an inflamed part is to be kept at rest, and a wounded surface is to be kept clean. But increasing knowledge reveals that pyloric obstruction may be due to other causes than simple inflammation, or a superficial erosion of the mucous membrane. Palliative measures will not cure the more serious cases, and it is as unwise to leave them to nature, aided by simple remedies, as it would be to expect the cure of severe and bleeding piles, by keeping them clean, or of a tight stricture of the urethra, by administering a sedative injection.

The general symptoms of pyloric obstruction may be gathered from the cases quoted in the preceding pages. There is usually pain of the nature of dyspepsia felt an hour or two after taking food. The pain depends more upon the quantity of food taken than upon its quality. It is relieved by vomiting. The severity of the vomiting increases with the length of time the patient has suffered. It is usually copious and is often painful. It is not a mere emptying of the stomach, for when the patient has vomited a large quantity, he will in an hour vomit as much again, although he has taken nothing in the interval. The attacks of vomiting are often worse at night than in the daytime. This seems to be particularly the case with business men, who perhaps take a light breakfast, have but little lunch, and make their chief meal in the evening. The attacks of vomiting, therefore, like the

pain, bear a definite relation to the quantity rather than the quality of the food taken. The quantity of fluid vomited, and the small amount of food digested, and absorbed, leads to very obstinate constipation. It is the relief of this symptom, which is hailed with the greatest joy by a patient, who has been cured by gastro-jejunostomy, and the regularity of the bowels is one of the best proofs to the surgeon that his anastomosis is working successfully many months after the operation. The same loss of absorptive power leads to diminution in weight, to a harsh and dry skin, to a brittleness of the nails, and to loss of the subcutaneous fat, in other words, the patient shows many of the signs of chronic starvation.

A systematic physical examination of the abdomen should be made in every case, where there is reason to suspect that the patient may be suffering from pyloric obstruction. The patient should lie flat on his back on a couch, with the knees bent and the shoulders slightly raised by a pillow. There should be a good light upon the abdomen, and, at first, the surgeon should merely watch the abdominal movements without touching the patient. In thin people, in a case of marked pyloric obstruction, the outline of the dilated stomach can often be seen with slow waves of peristalsis passing across the upper part of the abdominal wall from left to right. These waves are themselves characteristic of some obstruction to the outflow of the gastric contents, and, I think, that the more healthy and active the person is, the more marked are the waves. In other words, I would rather see them than not, for, where they are well marked, I think rather of mechanical obstruction than of cancer. The surgeon now places his hand flat upon the abdominal wall, and his practised touch readily discovers the outlines of the enlarged stomach, even if there be no tumour or nodule perceptible in it. In children, the pyloric thickening can sometimes be felt as a cylindrical or small sausage-shaped swelling, about an inch in length, to the right of the middle line, and nearly midway between the ensiform cartilage and the umbilicus. But the position of the pylorus varies greatly, and, when the stomach is dilated, it often points backwards, and is situated much to the right, or to the left, of its natural place. It is sometimes very difficult to discover, and the absence of a

tumour does not preclude the diagnosis of pyloric obstruction. Percussion is not of any great value in determining the size of the stomach, because a dilated stomach is often associated with a distended colon, and it is difficult to distinguish the note yielded by one from that of the other. Auscultation, too, is of no great service except to elicit the succussion splash. A dilated stomach can be easily distended by pumping in air, a proceeding which, though painless, is unpleasant to the patient, or by the cruder method of administering separately the constituents of a Seidlitz powder. With these guides, there is really no excuse for overlooking a dilated stomach, or for being doubtful as to the existence of such a condition.

The teeth and gums should always be examined, as a matter of routine, to eliminate the possibility of the dyspeptic symptoms and constipation being due to chronic lead poisoning. It is better not to give a definite diagnosis until the bowels have been satisfactorily emptied by means of an enema, repeated if necessary, and it is wise to examine the abdomen more than once, and at different times after meals.

A test meal should be given, and the presence or absence of free hydrochloric acid should be noted. The usual test meal consists of a thick slice of bread and butter with a breakfastcupful of weak tea sweetened, but without milk. The meal is given at breakfast time, and is withdrawn from the stomach an hour later by means of a stomach tube. The material withdrawn is filtered, and the residue is examined microscopically to see how far digestion has proceeded. The filtrate is tested with Günsberg's reagent for free hydrochloric acid. A few drops of the filtrate are mixed in a porcelain dish with an equal quantity of a solution consisting of phloroglucin 2 parts, vanillin 1 part, and absolute alcohol 30 parts. The mixture is evaporated to dryness at a gentle heat, and, if free hydrochloric acid is present, red crystals will form. As a broad rule, free hydrochloric acid is present in simple pyloric obstruction, it is deficient or absent in cancer of the stomach.

Palliative treatment in cases of pyloric obstruction is chiefly directed to relieve the vomiting. This is done by rectal feeding and washing out the stomach, since the indications are

clearly to keep the stomach empty, and prevent putrefactive changes. The stomach is washed out with a warm solution of bicarbonate of soda (20 grains to the pint). A soft tube is passed into the stomach and its contents are evacuated, half a pint of the solution is then poured into the tube and is allowed to run out again, and this is repeated several times. In the early stages of pyloric obstruction, the stomach need only be washed out every other day, and this is done most conveniently before breakfast ; but, in the later stages, when the vomiting is most distressing at night, the stomach should be washed out every evening just before the patient goes to bed, and about four hours after the last meal.

It is obvious that this treatment is only palliative, and it follows, from what has been said already, that patients, who suffer from painful vomiting, with loss of flesh and constipation, should always be examined carefully to find out whether there is any dilatation of the stomach. When the stomach is dilated, and diet, combined with simple remedies, fails to bring about a cure, there should be no hesitation in recommending an exploratory incision with a view to the performance of a posterior gastro-jejunostomy by direct suture.

The operation should not be postponed until the patient has exhausted himself, because early operation is attended with comparatively little risk, and has a twofold advantage. If the patient is found to be suffering from cancer of the stomach, much more radical measures can be pursued in the early stages of the disease, than if delay has allowed the growth to infiltrate all the surrounding tissues. But even if the constriction proves to be due to malignant disease, and removal is impossible, gastro-enterostomy serves excellently as a temporary expedient. It has, too, the advantage over colotomy for the relief of an analogous condition in the rectum, that it leaves no open wound. The patient, therefore, is able to go about his ordinary work, until the progress of the disease renders him incapable of further effort. But if, on the other hand, the patient is suffering from pyloric obstruction, which is not due to cancer, the surgeon can promise him a speedy relief from all the disagreeable symptoms, and a prolongation of his active life for many years in comfort.



VALVULAR DISEASE OF THE HEART.

II.—MITRAL REGURGITATION.

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MITRAL regurgitation exists whenever, during ventricular systole, part of the blood, that should pass forward into the aorta, passes back into the left auricle. From clinical records, it would appear that mitral regurgitation is the most frequent of all valvular lesions: indeed, in 2,230 cases of mitral disease, simple regurgitation was present in 1,025, or 46 per cent., and regurgitation with obstruction in 901, or 40 per cent.; but post-mortem records tell a very different tale. In cases, referable to initial acute endocarditis, or arising out of the degenerative condition commonly designated chronic endocarditis, it is rare to find regurgitation without some degree of stenosis, from which it follows obviously that mitral regurgitation, as the sole defect, is, in spite of the clinical evidence, chiefly present in the defects of the valve apparatus that occur independently of endocarditis, and these we shall show to be a very small proportion of all cases. The fact is, that combined lesions of valves are the rule, and simple lesions the exception, yet inasmuch as post-mortem evidence is available in only a small moiety of all cases, it is convenient and customary to set to the account of mitral regurgitation those cases that clinically appear to be so.

The incidence on the two sexes is far more nearly equal than is the case in mitral obstruction. Of 524 cases, I have found 288 to be females and 236 males; but if those of acute inflammatory origin alone were considered, there would be a larger preponderance on the side of the female sex. This greater frequency of origin, apart from acute endocarditis, will also explain the somewhat higher age prevalence, as compared with that of mitral stenosis given in my former article. From an analysis of 291 cases I find:—

Under 5 years of age	-	-	-	14 per cent.
Between 10—20 years	-	-	-	30 „
„ 20—30 „	-	-	-	11 „

Between 30—40 years	-	-	-	-	17 per cent.
„ 40—50 „	-	-	-	-	17 „
„ 50—60 „	-	-	-	-	6 „
Over 60 years	-	-	-	-	5 „

This group of cases is composed exclusively of patients admitted to hospital, and a legitimate inference is that the initial acute endocarditis is most commonly between 10 and 20 years of age, and that the terminal period of failure of compensation is commonly delayed until after 30 years of age.

It should be clearly understood that closure of the mitral orifice, during ventricular systole, is effected quite as much by contraction of the muscular sphincter around it, as by adaptation of the valve curtains, so that cases of mitral regurgitation fall into two broad groups, according as (*a*) the valve apparatus is primarily affected, or (*b*) the muscular sphincter is incompetent without affection of the valve. The former group is by far the larger, covering, as it does, all cases in which cusps, chordæ tendineæ, or muscoli papillares are affected either by acute inflammation, chronic degeneration, or rupture. The latter and smaller group comprises those cases in which contraction of the muscular sphincter is defective, either from inherent weakness, or from functional nervous disturbance.

It is unnecessary here to enter into any detailed discussion of the causation of acute endocarditis: suffice it to say that it may arise in the course of any acute infection, and we may include in the group of causal infections, on unimpeachable evidence, rheumatic fever, chorea, scarlet fever, pneumonia, typhoid fever, influenza, acute tuberculosis, and gonorrhœa. There is a strong case also for measles and small-pox. Rheumatic fever far outnumbers all other diseases combined as a cause of acute endocarditis, particularly of the mitral valve, for which it has a special predilection. Of 316 cases of mitral regurgitation, 189 were directly assigned to rheumatic fever, 12 to scarlet fever, and 10 to chorea.

Chronic sclerosis of the mitral valve, inducing regurgitation, is apt to follow in the train of gout, syphilis, alcoholism, or Bright's disease, or to be the outcome of prolonged physical strain. Let us hesitate to regard it ever as a stigma of old age, that has no other burden than its weight of years! Sclerosis

of this sort, though common enough at the mitral orifice, hits the aortic valve more often and more hardly.

Rupture may occur in a perfectly healthy valve or chorda tendinea, but far more often in one that has been the seat of previous endocarditis. Sudden violent effort is the usual exciting cause, but there is no doubt that, at times, a heavy blow over the heart has brought about the rupture. I have actually witnessed the occurrence of rupture in a strong young man, engaged in pitching faggots on to a stack, and in this case there was certainly no antecedent endocarditis. Aneurism of a valve may sometimes perforate, and produce a spurious condition of rupture.

Muscular insufficiency, with consequent dilatation of the mitral orifice, may occur in any condition of dilatation of the left ventricle with its manifold causation, and is thus particularly associated with aortic disease, fatty and fibroid degenerations of the myocardium, and severe anæmia. Insufficiency of muscular type may also exist without actual dilatation of the mitral orifice, for, in nervous subjects and others, contraction may be ineffectually performed.

In simple acute endocarditis, the changes in the valves consist, as a rule, of little beyond a fringe of soft vegetations along the free border of the mitral valve on its auricular aspect. There may be even less than this, for in some cases of chorea the whole change consists of a sub-intimal beading to which, of course, fibrin does not adhere. It is the exception, if death occurs at this stage, to find vegetations on the chordæ tendinæ, unless the endocarditis has been of virulently septic type. In such cases, the lesion has a much wider extent, affecting usually the wall of the heart, as well as the valves, and is far more deeply destructive, while the fibrinous deposit is abundant, and often teeming with micro-organisms. In the chronic condition that follows recovery from the acute attack, shrunken remnants of vegetations may often be seen, but they are then firm and welded to the valve, and may be infiltrated with calcareous salts, the same changes having likewise spread to the valve, rendering it rigid and thickened, and not infrequently shrunken and puckered as well. As a rule, the changes are most marked in the large anterior cusp. With any considerable degree of rigidity, there must needs be obstruction of the orifice, as well as

incompetence, and this is increased if the inflammation has led to cohesion of the cusps. A rare anomaly is to find one or other mitral curtain adherent by its ventricular surface to the wall of the ventricle, so that it can take no part in the attempt to close the orifice. The chordæ tendineæ are usually thickened and shortened, sometimes to such a degree that the muscoli papillares may appear to be directly implanted on the valve: the summits of the muscoli papillares will then be firm and resistant to the touch, and even calcareous. On the other hand, elongation of the chordæ tendineæ is occasional, so that, during systole, the curtain bulges into the auricle. Not infrequently, the fibrosis has spread in either direction from the valve to the adjacent endocardium of both auricle and ventricle, giving it an opaque tendinous appearance. Along with the defect of the valve and its appendages, there may be actual dilatation of the mitral orifice, but this is certainly very exceptional in cases that have originated in acute endocarditis.

Though identical in their general appearance, the changes of primary sclerosis of the valves present some minor differences from those that follow in the train of acute endocarditis. As a rule, it is the smaller mitral curtain that is chiefly affected. In the least degrees, there is not much more to be felt than the thickening of an atheromatous plaque in the substance of the valve, which, if it does not affect the edges of the cusp, may not give rise to regurgitation. From this, there is every degree of thickening and rigidity up to a condition, in which the whole valve apparatus is welded into one calcareous mass. This form of mitral disease is found along with atheromatous arteries, systemic and coronary. Speaking generally, in the endocarditic form, contraction predominates over rigidity, while, in the arteriosclerotic form, rigidity predominates over contraction.

It is customary to speak of rupture of a valve, though nearly always it is a chorda tendinea that is ruptured, and not the valve, and usually that of the anterior cusp. It gives way more often at one end than in the middle, so that it floats free in the blood stream. Its rupture will permit the mitral curtain to bulge during systole into the auricle, so that the mitral orifice gapes. A musculus papillaris is very rarely rent asunder.

As is well known, mitral regurgitation may exist without any change in the valve: for example, there is often found stretching of the auriculo-ventricular orifice. To produce incompetence, this stretching must be considerable, for the normal valves have a reserve of expansibility that will remedy slight defects, but in high degrees of dilatation this is not the case. Such dilatation of the orifice is far more commonly found along with dilatation of the left ventricle: indeed, this latter condition may lead to incompetence, without any marked stretching of the ostium, for unless the *musculi papillares*, by a simultaneous elongation, keep pace with the distension of the ventricle, they will fail in their function of ensuring a nice adjustment of the valves. Insufficiency of this sort is found with the cardiac dilatation that complicates the acute infective fevers, and the persistent over-action of Graves' disease, in degenerative conditions of the myocardium and adherent pericardium, and as a secondary consequence of aortic regurgitation or chronic renal disease. It is theoretically possible that insufficiency of muscular origin may occur, with healthy valves and *chordæ tendineæ*, and without dilatation of the orifice, if the contractility of the muscular sphincter, which is an important agent in its closure, is impaired, either by nervous disturbance, or by inherent weakness.

Whatever the cause of the regurgitation, there is sooner or later some visible thickening of the auricular endocardium brought about by the increased strain. This affects the whole extent of the auricle, and is distinct from the inflammatory thickening, above described, which is limited to the endocardium adjacent to the valve. As to the size of the left auricle, there are found but two conditions, viz., dilatation or dilatation with hypertrophy: the former is commonly found when the reflux is considerable, the latter when it is less, provided general health is good. The almost invariable condition of the left ventricle is a combination of dilatation and hypertrophy, the former being necessary to enable the ventricle to receive the persistent surcharge of the left auricle, and the latter to enable the ventricle to get rid of it. In the pulmonary circulation, in cases of long standing, there is apt to be dilatation of the pulmonary veins, and some degree of atheroma of the branches of the pulmonary

artery. In the rare instances of audible pulmonary regurgitation, no defect of the pulmonary orifice is found post-mortem, as the incompetence is due to stretching of the pulmonary artery, which disappears with death. The condition of the right ventricle is nearly always that of hypertrophy with dilatation, and the relative amount of hypertrophy is generally inversely proportional to the amount of mitral regurgitation. It is this chamber of the heart, with far less assistance from the left auricle than is afforded in mitral obstruction, that is responsible for maintaining compensation. By and bye dilatation gets the upper hand, and ends in tricuspid regurgitation with dilatation of the right auricle. It is obvious, then, that, in a case of long standing, there will be general enlargement of the heart: the heart itself shows the signs of passive congestion in its deep purple red colour, and is usually also firmer than normal, except in the presence of pronounced fatty change. Adherent pericardium is, as would be expected, less frequently found with mitral regurgitation than with mitral stenosis. Of 100 cases taken consecutively from post-mortem records, adherent pericardium was present in 23, while, in mitral stenosis the proportion was approximately 40 per cent.

It would be out of place here to consider in detail the appearance of the lungs and other viscera. The process is everywhere the same, first, passive congestion, later super-added fibrosis, varied only by accidental features.

Acute simple endocarditis, for all its seriousness, has but an ill-defined clinical identity, for the very reason that it is commonly only one feature of a general febrile infection. It may even be afebrile, or, at any rate, it may cause no elevation of temperature on its own account. In those cases in which we can watch its development, there is as a rule some blurring of the first sound, that insensibly becomes a murmur, with some evidence of dilatation of the heart and enfeebled pulse, and a slight upward trend of temperature, falling again in the course of a few days. From this mild and habitual type, there is every gradation up to the complete picture of the malignant type. In such case, along with the evidence of endocarditis, the fever will be persistent and of septic character, often with sweatings and rigors, and always with symptoms of profound general toxæmia and progressive

cachexia. Such a condition, however, is seldom primary, but, almost without exception, grafted on to a pre-existing endocarditis. It is often difficult to say whether we have to deal with a malignant, or merely with a severe, simple endocarditis. If, however, in the presence of the above symptoms, micro-organisms are found in the blood with pronounced leucocytosis, if a focus of sepsis is discovered, and there is frequent occurrence of embolism, the case may fairly be written down malignant.

Very different from the above is the everyday dress of mitral regurgitation, as we meet it in chronic cases. There may be no subjective symptoms whatever so long as compensation be perfect; but in most instances, even while compensation is good, shortness of breath is apt to be felt on undue exertion, but readily disappears with rest. Later, however, this transitory trouble tends to become persistent, maybe with palpitation and præcordial uneasiness, seldom amounting to pain. Indeed, præcordial pain is rarer in mitral regurgitation than in any other valvular lesion. Anæmia and attacks of faintness, or actual fainting, sometimes lead to the seeking of medical advice. Epistaxis is another occasional early symptom, but hæmoptysis is very rare at an early stage, and as a late consequence is, as we have shown elsewhere, far less common than in mitral obstruction. A short dry cough may tell the tale of bronchial engorgement, and later the cough is accompanied by a thin watery expectoration. In some cases, the loss of circulatory equilibrium is felt in the organs of digestion, and the complaint is of gastric disturbance, usually of the flatulent atonic type, from alimentary myasthenia. In women, the menstrual function may be disturbed, but in no certain manner. In 50 cases of women between the ages of 17 and 40, the menses were normal in 31, in abeyance in 3, diminished in 4, too frequent in 8, excessive in 4. On the whole, amenorrhœa, partial or complete, tends to be an early symptom, and menorrhagia or metrorrhagia late. Frequently, in advanced cases, the evidences of disease are unmistakably written in the patient's face. In spite of the general anæmic aspect, the face is congested, more particularly the cheeks, nose, lips, and ears; capillary ramifications appear on the cheeks; the eyeballs

look watery, perhaps a little injected, and often stained with bile; in some cases, there is actual cyanosis of the congested areas. Cerebral congestion induces headache and disturbed sleep, wakeful nights of orthopnoea alternate with drowsy days, and a drowsiness that is intensified by taking food. Some patients become inert and apathetic, others irritable and intractable.

Dropsy first appears almost invariably about the ankles and feet. At the outset, it occurs only after a day's work or a day in the erect posture, and disappears at night, but gradually comes to persist, and mounts upwards over the whole limb, and to the scrotum and abdominal wall. The urine is scanty, of high-colour and high specific gravity, and often tinted with mucus, while defective oxidation leads, at the expense of urea, to an increase of urates, that yield a heavy deposit on cooling. Albumen, when present, tends, like the water of the urine, to fluctuate in amount with the varying strength of the heart. In advanced cases, hyaline casts are the rule, and occasionally blood, and blood casts, appear from capillary rupture. For the rest, the progress consists in effusion, now here and now there, into one or other serous sac, or diffusely into the subcutaneous lymph spaces. Just as in mitral stenosis, ascites tends to precede anasarca, so in mitral regurgitation anasarca precedes ascites. When the reverse is the case, it is usual to find some further cardiac lesion than simple mitral regurgitation.

Sudden death is far rarer in mitral than in aortic disease.

The first symptom of rupture of a valve causing regurgitation is, as a rule, a sudden sense of something giving way in the chest, followed by intense distress and dyspnoea, and sometimes even cyanosis. These are the most serious cases, and the patient may not survive the accident many days. But more often, there is a very slow recovery of some degree of physical activity, though that only of a cardiac cripple. Instances, however, are plentiful in which the initial symptoms are far less marked, and life is prolonged, with comparative comfort, for many years.

When the mitral incompetence is of renal origin, or, perhaps, has become complicated by renal disease, the evidences of circulatory stress are apt to be blended with those of a

general toxæmia. It is in these cases that paroxysmal dyspnoea is so frequently seen, presumably, of a mingled renal and cardiac origin. Uræmia may then administer the *coup de grâce*.

Præcordial bulging usually means that the cardiac trouble has been present from early childhood, when the ribs yield readily, and the same is the case with the clubbing of the finger ends.

The position and character of the apex beat, when visible, is very variable. Most commonly it is displaced outwards, but if the left ventricle, as well as the right, is substantially enlarged, it will have a downward displacement as well. When there is much dilatation, it is wavy and diffused, and only when there is much hypertrophy, a well-defined heaving impulse. It is remarkable, however, how closely in this respect the higher degrees of dilatation at times simulate the heaving of hypertrophy.

Epigastric pulsation is usual, and, with hypertrophy of the right ventricle, heaving pulsation over the front of the heart. Pulsation in the second left space is much less common than in mitral stenosis. Pulsation may be seen at the root of the neck, but, unlike that of aortic regurgitation, does not extend to the upper part of the neck. If the tricuspid orifice is incompetent, the jugulars will be turgid and pulsating.

A thrill is most rare, but its existence can hardly be denied. In the records of one of my hospitals, it is noted in 17 out of 200 cases, male and female. From my own experience of a necessarily much larger number of cases, I cannot claim to be convinced of its existence. At best, it is a feeble rustle beneath the hand, and has none of the harsh, vibratile character of the thrill of mitral constriction. The closure of the pulmonary valves is less often, and less clearly felt, than in mitral constriction.

Percussion shows enlargement of the heart both to right and left, and in many cases in a vertical line, so as to reach as high as the third rib or higher. Enlargement of the left auricle may be determined by auscultatory percussion of the mitral area in the back.

The systolic murmur may accompany, or follow, the first sound, not replace it : what is commonly termed replacement is the occurrence of a murmur simultaneously with a first sound,

which is largely, but *not entirely*, obliterated : as a fact, the first sound in the mitral area is invariably weakened in mitral regurgitation. The murmur, when accompanying the first sound, always encroaches on some part of the first silent period. Unlike the presystolic murmur, it is always loudest at its commencement, and least loud at its close, for the force and rapidity of reflux are naturally at a maximum, when the ventricle is full, and lessen progressively as it empties, and the auricle fills. When the first sound is apparently normal in character, and yet is followed by a systolic mitral murmur, the presumption is that the valves close, but do not maintain apposition, during the whole of systole. No other cardiac murmur is so variable in character and intensity. It may be blowing or rasping, high-pitched or low-pitched, vibratory or musical. A vibratory character is not uncommon in rupture of the valve, and may be due to the lacerated valve, or chorda tendinea, vibrating in the blood stream. A musical element is sometimes interpolated into a murmur, and usually indicates that the murmur is produced under very high pressure, such as might result from a combination of aortic stenosis, with considerable hypertrophy on the one hand, and a narrow chink in the mitral orifice on the other. Similarly, the murmur may be loud or soft. Loudness is no measure of the amount of insufficiency, but, if anything, only of the strength of the ventricle, and this will usually be greatest where the leak is least. Exertion and excitement tend to make the murmur louder, because they make the heart temporarily more energetic. Some of the softest of all murmurs are produced by a weak ventricle with a large leak. It is desirable to examine the patient, both in the erect and the recumbent posture, for a murmur is often brought to light by recumbency : usually, but not invariably, the murmur is most distinct in the recumbent posture. The common site of maximum intensity of the murmur is at the outer side of the apex beat, in spite of the fact, that the sound is produced at the level of the third costal cartilage, an inch or more to the left of the sternum. The murmur of tricuspid regurgitation is never heard outside the apex, though it may extend to its inner side. The common explanation of the intensity being greatest at the apex is that the heart is there parietal, and its sounds are not obscured by

intervening lung, while the murmur is conveyed to the apex by the muscoli papillares and the muscle of the left ventricle. When the murmur is heard only or most distinctly well outside the apparent apex beat, it usually means considerable enlargement of the right ventricle, which itself forms the apex, while the left ventricle is displaced outwards and backwards. Occasionally the murmur is most audible at the left border of the sternum, and, still more rarely, as high as the pulmonary area. I have also heard a systolic mitral murmur louder in the dorsal mitral area than at the apex. These two latter conditions are clearly due to the reflux into the left auricle being most clearly heard in the neighbourhood of the left auricle. The familiar line of conduction of the murmur is towards the left axilla, and to the area between the border of the left scapula and spine, opposite the sixth and seventh dorsal vertebræ. The degree of audibility of a murmur, at this site, has some relation to the degree of dilatation of the left auricle and its propinquity to the chest-wall : the same is true of its conduction downwards along the vertebral column, for a soft murmur is often conducted further in this direction than a loud one. The murmur will sometimes disappear in advanced stages of heart failure, when the muscle is profoundly altered, so that systole is not strong enough to produce a murmur. With a very rapid heart action, it is often impossible to decipher a murmur which becomes quite plain as the rate decreases. Another common occurrence in mitral regurgitation is for a number of small ineffectual beats to be followed by a single steady and relatively strong beat, with which alone the murmur becomes audible.

It is important in auscultation to note the character of the second sound, from which one may get much the same evidence of the state of the right ventricle as the radial pulse gives of the left. From the first, the increased pressure in the lesser circulation intensifies the sound, and, progressively so, as the right ventricle becomes stronger. When the right ventricle fails, and tricuspid reflux is established, the accentuation of the pulmonary second sound vanishes also. Reduplication of the second sound is far less common than in mitral stenosis, and the same is true of the rare regurgitant murmur of pulmonary relief. Tricuspid regurgitation hits both sides of the heart

alike, for the mitral reflux will be increased when the forces in the pulmonary circulation, that tend to minimise it, cease any longer to afford an effective obstacle.

During compensation, the pulse is, as a rule, of rather low tension, but quite regular in force and frequency, though the latter may be slightly accelerated: later, with increasing rate and emptiness, irregularity of force and rhythm appears. We have already referred to one common form of irregularity, in which a series of quick small beats is followed by a single relatively slow and strong beat. Another common form is a succession of quick small beats, followed by a pause, due to the dropping of one or more beats. Intermission, in some other cases, is due to the beat of the heart being so small as not to propagate a pulse to the wrist. In the last stages, the pulse may be so small and quick that a sphygmographic tracing consists of an almost horizontal, but slightly undulating, line. The causation of these irregularities has been much discussed. It is no help to refer them to changes in the cardiac muscle, though such are certainly present, while to refer them to perverted innervation merely begs the question. If either explanation were adequate, irregularity should be as characteristic of aortic as of mitral disease. Potain has referred arrhythmia to the fact, that the respiratory movements cause great variation of intra-thoracic pressure in inspiration and expiration, which will be greatly felt by the thin-walled left auricle; and Broadbent expands this idea, in the observation that, in incipient irregularity, the break of rhythm occurs at the beginning or end of either phase of respiration. I have been unable to confirm this observation in a considerable number of cases, and were it correct, it is difficult to see how, even in health, the heart could be regular in force and rhythm.

There is rarely much difficulty in deciding at which orifice a murmur is produced, if attention is paid not only to the site of maximum intensity, but to the character and conduction of the murmur and to any associated changes in the heart. It is true that the mitral and tricuspid territories somewhat overlap, *i.e.*, a mitral systolic may be heard all over the tricuspid area, but a tricuspid murmur never reaches beyond the left border of the apex beat, and, *à fortiori*, is never heard in the back.

A systolic murmur in the mitral area may have the characters above described, and yet be not due to mitral regurgitation. Such a murmur may be hæmic or exocardial ; and, even if assured of the existence of regurgitation, it is essential to know, whether we are dealing with incompetence due to permanent disease, or incompetence due to myasthenia that may be temporary. I know not a single criterion of distinction of the so-called hæmic murmur that is not fallacious. Hæmic murmurs, at some orifices, may even be present in the absence of anæmia, and at the mitral orifice, it is at least probable that the hæmic murmur is due to actual regurgitation, and, therefore, has all the characters of a regurgitant murmur. The diagnosis must be at best a balance of probabilities. For all this, a systolic murmur at the apex in an anæmic subject, who has succumbed to none of the causes of endocarditis, that is soft and blowing and but little conducted, that is associated with no more than a vestige of dilatation of the left ventricle, and with the presence of a soft systolic murmur at the pulmonary or aortic orifice, is almost certainly due to anæmia.

Again, there are certain apical systolic murmurs that are frequently met with in nervous subjects, particularly in those under the agitation of examination for life assurance. The most frequent is one just external to the apex, heard only, or with far greatest distinctness, during inspiration, and often obliterated by holding a shallow breath. There can be no reasonable doubt that it is due to an energetically acting heart, pulsating against a pad of lung, intervening between it and the chest wall, and chiefly when the lung is distended in inspiration. The constancy of this murmur depends on the constancy of energetic action of the left ventricle. If there be hypertrophy, it will tend to persist, whereas, if the overaction be due to nervous causes, it will disappear with the disappearance of nervousness. Another apical systolic murmur, heard under similar conditions, but present equally with every beat of the heart, and strictly synchronous with it, appears on placing the stethoscope immediately over the apex, but which disappears on its being moved slightly to either side. This would seem to be due to the action of an energetic systole on the column of air, between the chest and the ear of the listener. It somewhat resembles the puff of a bellows, and fades as the heart quiets

down. Neither of these murmurs is conducted, and neither is accompanied, necessarily, by any other sign of circulatory disturbance: neither in any degree replaces, or weakens the first sound, which is exceptionally full and forcible: neither undergoes any constant variation with change of posture.

As a general rule, the murmur due to organic disease of the valve is harsher than that due to muscular relaxation, while the latter is apt to be later in systole and to be heard in addition to the first sound. Not even the presence of a presystolic murmur is absolutely diagnostic of valvular change, for such a murmur is occasionally found in dilatation of the left ventricle. The previous history of the patient, read side by side with the results of physical examination of the heart, will be far more reliable guides than any subtle distinctions of auscultation. The same also is true in distinguishing a lesion, that is the sequel of acute endocarditis, from one that is due to arteriosclerotic change involving the valve.

Are there any sure criteria by which to gauge the amount of regurgitation in mitral incompetence? There are unquestionably some objective signs, that afford valuable information, yet not such as to outweigh the patient's own subjective sense of comfort and freedom from circulatory disturbance. Other things being equal, a small ill-filled pulse of low tension suggests a large leak: similarly, much enlargement of the left ventricle, with preponderating dilatation, points to a large leak, and a dilated left auricle. The conductivity of the murmur to the mitral area in the back is likewise evidence of the degree of dilatation of the auricle, which, in turn, is commensurate with the leak. The degree of replacement of the first sound by the murmur is no doubt indicative of the ability or disability of the mitral valve to produce a tension sound, but the degree of disease of the valve is no measure of the regurgitation. The longer the murmur the less is the leak, as with a large leak the ventricle will empty itself more quickly than with a small one. The amount of dilatation of the right ventricle is roughly proportional, and the amount of hypertrophy in vessels proportional to the mitral reflux. So long also as the tricuspid valve is competent, the amount of accentuation of the pulmonary second sound affords some information as to the size of the leak.

Mitral regurgitation may be the least serious of all valvular lesions, except perhaps aortic stenosis. A systolic mitral murmur arising in the course of acute endocarditis may even disappear. This may reasonably be referred to resolution of the inflammatory process, though it is impossible to say, in such a case, that the murmur was not of myocardial origin. The double mitral lesion affords a graver prospect than either mitral lesion alone. It is impossible, in the space at our disposal, to consider all the points that influence prognosis in valvular disease. Before coming to any conclusion, it will of course be necessary to form an accurate judgment as to the cause. The incompetence of valvular disease must be distinguished from that of muscular disability, and each, in turn, must be traced back to its existing cause. It is better that valvular change should have originated in acute endocarditis than in arteriosclerotic change. The duration of compensation will greatly depend on the power and willingness of the individual to test the heart. Pregnancy is harmful, repeated pregnancy disastrous. Parturition, too, not infrequently converts a simple endocarditis into one of malignant type. We must try also to estimate the amount of the leak, and, by careful physical examination, to detect what changes have occurred in the ventricles.

Irregularity and inequality of the pulse usually prelude trouble. When breakdown is complete, with diffuse dropsy and failure of the right heart, by appropriate treatment, a respite may yet be gained, but it is short, increasingly short, and the day of reckoning is at hand. Sudden death is very rare in uncomplicated regurgitation, unless the heart muscle be fibroid or fatty, and embolism, systemic or pulmonary, is less frequent than in mitral stenosis.

In the treatment, or neglect of treatment, of acute endocarditis of the mitral valve, there will be general agreement as to the possibility of doing much harm, however much opinions may differ as to the opportunity of doing good. If a patient be under observation for one of the acute infections that may lead to acute endocarditis, the heart should be watched daily. At the present time, there is no justification for the routine use of anti-sera as prophylactic remedies. The large majority of cases of acute endocarditis are pure infections, in which the

streptococcus plays no part, so that the routine use of anti-streptococcic serum is illogical. More often than not, it is impossible in life to isolate the organism from the blood, and when this has been successfully accomplished, the use of the appropriate anti-serum, and latterly in one case the employment of the appropriate vaccine by Wright's method, are as yet methods that have failed. Experience, such as this, makes one despair of better results, even when, by improved methods of cultivation of micro-organisms from the blood, we may be able to ensure early identification of the cause.

In the case of acute rheumatism, salicylates will be used freely, but other antiseptic drugs appear to be quite useless. I have tried intravenous injections of formalin, 50 cc. of 1 in 2,000 normal saline at a dose without benefit, and others have found a like result.

A difficulty in giving drugs in acute endocarditis is often encountered in the irritability of the stomach. In the case of salicylates, this is readily obviated by painting methyl salicylate on the joints, from which it is very rapidly absorbed into the circulation. If the odour is objected to, a liniment of equal parts of mesotan and olive oil, applied with the lightest friction, is an efficient substitute.

Still, if we cannot inhibit the activity of the infective organism, or neutralise its poison, it is possible to put the heart in the best position to work out its own salvation. With all the evidence we have, both in the prevalence of endocarditis in the left heart, and in its particular location on the valves, and also in the apparent fact, that acute endocarditis of the right heart often clears up, while on the left side it seldom, if ever, disappears, it is clear that special care should be devoted to diminishing the strain on the valves, by absolute rest and recumbency, in a bright airy room. If such rest were maintained more often for a period of several weeks after subsidence of the acute process, it is possible that disappearance of the mitral murmur would be less rare. Sufficient weight is hardly attached to the sedative influence of sleep on the heart, and remedies, directed to this end, have an important part to play. Of morphia, chloral, bromide, paraldehyde, veronal, and hydrobromic acid, each

has its supporters. Food, too, should at this stage be unstimulating and easy of digestion, and flatulent distension of the stomach and bowels must be guarded against. Keeping the bowels loose will help to keep the blood-pressure low, and saline aperients serve well this end. I have frequently employed Caton's method of iodide of potassium by the mouth, and a flying blister over the heart, but have seen no benefit from it.

Not infrequently, the mitral incompetence is associated with acute cardiac dilatation. The local application of an ice-bag continuously to the præcordium is then the best of all remedies. The ice-bag may sometimes be combined with preliminary leeching. Why the abstraction of a few drachms of blood should so often be followed by an immediate diminution in the area of the heart, that amounts even to inches, is as puzzling as it is true. The more rapidly acting cardiac stimulants, such as alcohol, ether, ammonia, and strychnine, are more appropriate than the specific cardiac tonics, such as digitalis and strophanthus, which come but slowly into action, even when administered under the skin. It is very rarely that recourse to oxygen inhalations and free administration of strychnine will be needed. During convalescence from an acute attack, a combination of citrate of iron and ammonia, with iodide of sodium, may be given for several weeks, while, gradually, normal modes of life and normal dietary are resumed.

Passing to chronic mitral insufficiency, so long as compensation is maintained, treatment consists in the leading of a quiet life, well regulated in all respects, and with only such restrictions as are applicable to all forms of valvular disease. During this stage, it is the physician that should be inert, not the patient. Too much rest in heart disease leads to obesity, and therewith, the addition of another burden to the heart, if indeed it may not be directly weakened. It is a mistake to depend on modifications of diet alone to correct this. A largely nitrogenous diet is particularly unsuitable for cardiac cases, and the best results will be obtained from a mixed diet, restricted in amount, and abstinence from alcohol.

With the first appearance of failing compensation, a

common mistake is too early employment of the specific cardiac tonics. More often than not, it is irritability that needs treatment rather than weakness, and sedatives are indicated rather than stimulants. Bromide of ammonium, for example, with arsenic, may be used. Diet should be so regulated as to avoid dyspeptic disturbance, and it should be pruned of cardiac irritants, such as tea, coffee, and alcohol, while tobacco should be restricted. The bowels, too, may need attention. Nor is it the heart alone that needs soothing, for, with the early consciousness of cardiac embarrassment, mental tranquillity is much disturbed, and a firm, cheerful reassurance will serve to turn the patient's mind outwards instead of inwards.

As soon as feebleness and irregularity of the heart set in, digitalis is the drug par excellence. By increasing the diastolic aspiratory energy of the heart, it helps to unload the veins, and, by removing this resistance, enables systole to act at a greater mechanical advantage. The brisk contraction of the left ventricle not only serves to fill the arteries better, but also diminishes the amount of mitral reflux: to this end also the identical action of digitalis on the right ventricle co-operates. When there is high pressure in the arteries, or the arteries themselves are degenerate, digitalis should be given with great circumspection. If given at all, it may be combined with a vasodilator, such as liquor trinitrini, or replaced by strophanthus. Of the preparations of digitalis, one that is convenient, and as efficient as any, is Nativelle's digitalin granules, though the tincture is generally employed. It is important at this stage to cease administration of digitalis, as soon as its beneficial effects are fully established.

In the final stage of complete cardiac failure with diffuse dropsy, it is useless, and often harmful, to administer digitalis, until some effective measures have been adopted for relief of the general venous stagnation. In the slighter cases, rest in bed, combined with free purgation by saline or hydragogue cathartics, and milk diet for its diuretic effect, may suffice to clear the way for the action of digitalis, but in extreme cases neither purgatives, nor diuretics, are of any avail. Theoretically, the ideal treatment should be a preliminary venesection, with removal of six to eight ounces of blood, but in actual practice this is frequently objected to for one

cause or another. Failing this, a good plan is to sit the patient up, so that as much fluid as possible may gravitate to the feet, there to gain exit by a number of linear scarifications on the dorsum of the feet, and deep enough to reach the subcutaneous lymph spaces, care being taken not to draw blood. This method is far preferable to the use of Southey's tubes, which, with every possible care, only too often lead to suppuration. Before scarification, surgical cleanliness of the skin must be assured, and wrappings of boracic lint, wrung out in hot water, and surrounded by absorbent wool, must receive the drainage. As the fluid is drained away, the urine increases in amount, and digitalis restores the failing vigour of the heart. If desired, the action of digitalis may be reinforced by caffeine, which has a powerful diuretic influence, or the old formula, blue pill, digitalis leaves, and squill may be tried. Milk diet may now give place to a simple mixed diet: soups and meat extracts have no place in the dietary of cardiac failure. They take the form in which nitrogen should leave the body, not enter it: moreover, it is desirable that the diet should be relatively dry.

Massage of the limbs may now be undertaken with advantage. Its action on the skeletal muscles is identical with that of digitalis on the cardiac muscle, that is to say, it helps mechanically to empty the overloaded veins, and, at the same time, flushes the ill-filled arterioles with blood. The use of systematic muscular exercise completes the parallel, for by this means each muscle-bundle becomes a miniature heart, which compresses the vessels, as it contracts, and fills them, as it relaxes. That form of muscular exercise will be best which applies this principle most widely. This is one reason why Oertel's system of hill-climbing, admirable so far as it goes, but not extending to the muscles of all the body, has given place to the systematised exercises of Schott and Ling. Over and above the applicability to all the muscles of the body, another important consideration is the exact adaptation to the physical capability of the individual, as it varies from day to day. Schott endeavours to meet this by the employment of graduated resistance. The same advantages attach to the ingenious apparatus of the Zander institutes, that enable the patient to do, or to have done for himself, as much or as

little of the movements, as he pleases. Whatever the method, it is obvious that the opening up of a multitude of fresh vascular channels will afford a large measure of relief to an overburdened heart.

It is in mitral regurgitation, with failing compensation of all diseased conditions of the heart, that baths are likely to do good, and those of Nauheim may be taken as the type. Without claiming for them the extravagant effects asserted by some, no one who has used, or seen them used, can reasonably doubt their efficacy in some instances. Speaking from my own sensations, and personal observation of patients I can vouch for some initial slowing of the heart. It is difficult to see, to what to assign this, unless to stimulation of the cardio-inhibitory centre reflexly from the cutaneous nerve endings by the action of carbonic acid gas, for the same effect was not produced by the Wiesbaden waters, which differ mainly in the absence of free carbonic acid gas. Later there sets in an abiding dilatation of the cutaneous capillaries, with disappearance of the initial slowing of the heart. The former feature, though in a less degree, was appreciable with the Wiesbaden baths, so that presumably it may be referred to the action of both sodium chloride and carbonic acid gas. At the same time, one must not lose sight of the stimulation of the nervous system, and the deepening of respiration, that result from a bath. It is easy to see how these combined effects would lead to a strengthening of systole, and to a diminution in size of the heart over and above the apparent diminution due to fuller expansion of the lungs.



ORTHOPÆDIC SURGERY.

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FLAT FOOT.

THE efficient relief from the pain and discomfort of flat foot is a subject that presents many difficulties. It is essential, not only to be sure of the degree of flat foot, but also to fully grasp the causes, which are at work in its production. Briefly, flat foot may be characterised as a condition of relaxation of all those muscular and ligamentous structures which, by their tonicity, retain the bones and articulations in their normal relationship one to the other. To ascertain the causation of any alteration in these relationships is the first and most essential factor in the treatment of flat foot.

Clinically the cases present themselves as—(1) The flabby flat foot, which can be made to assume almost any position when the patient is at rest; but when the patient stands, the scaphoid and head of the astragalus descend almost to the ground, and all trace of an arch is lost. I do not think it has been commented upon elsewhere, but I have frequently observed that this particular kind of spurious talipes valgus is associated with two other conditions, namely, vaso-motor disturbance and the presence of varicose veins, and it therefore depends upon the altered circulatory conditions. The feet are often cold, and not infrequently bedewed with a clammy sweat. In such cases, it is not sufficient merely to put a pad into the boot. The vascular condition must receive attention, and both massage and the administration of nux vomica, and other circulatory tonics, are called for. The pad is not a sound measure, but the plan, originated by the late H. O. Thomas, of inducing by an alteration in the direction of the foot the natural restoration of the arch, should be adopted. In all feet, inversion and adduction are accompanied by raising the arch: eversion and abduction by lowering. H. O. Thomas, with his far-seeing insight into the physiological and mechanical problems involved in the treatment of deformities, grasped the essential

point in the treatment of these cases. He discarded the pad altogether, and elevated the inner sides of the soles and heels of the boots, placing no pad whatever inside. Instead he insisted on the inner aspect of the sole being absolutely plane, thus causing the arch of the foot to be physiologically raised as a part of the inversion. Of course other measures are not neglected, such as massage and exercises ; and very successful results follow this line of treatment.

(2) Another type is the spasmodic form of flat foot, and it gives rise to very grave difficulties in treatment. This variety occurs sometimes as a result of the persistence of the first form, but it is seen more especially after injury, such as a sprain of the ankle, or a badly set Pott's fracture, or subsequently to rheumatic fever, and a very inveterate form follows gonorrhœa.

In the *Archivio di Ortopedia*, 1905, Fascicolo I., pp. 1 to 10, Muscatello quotes a very interesting case occurring in a young sailor, aged twenty-one, who contracted gonorrhœa at the age of nineteen. Fifteen days after the onset of the trouble, he had intense pain in the right foot, about the medio-tarsal joint. This was followed by such swelling and distress that it was impossible for him to use the foot. The inflammatory œdema lasted for over a month, and then commenced to diminish, but the pain persisted. About seven weeks after the onset of his illness, a similar condition commenced in the left foot, and the swelling was more marked about the tarsus and the neighbourhood of the tendo Achillis. The acute symptoms in the left foot persisted for twenty-five days. When these had passed off, both feet were found to be flat, and the deformity increased steadily, until all traces of the arches were lost, and the feet were everted. He was placed under an anæsthetic, the valgus forcibly reduced, and the feet put up in plaster, with very satisfactory results.

On the question of the existence of a definite form of post-gonorrhœal flat foot, due to blenorrhagic arthritis, Muscatello quotes a list of authorities, with details of cases (p. 681).

Reverting to forms of spasmodic flat foot, other than gonorrhœal, there is great difficulty in overcoming the spasm. When it is not severe, and of long standing, it is often found, that after three or four weeks' rest in bed, the spasm entirely subsides, and then, with the wedge-shaped sole alluded to

above, the patient can get about quite satisfactorily, and the arch rises again. On the other hand, if the spasm has passed a certain degree of intensity, mere rest alone is insufficient. In these cases, section of the extensor communis digitorum and peronei tendons has been done often in vain. Mr. Robert Jones has practised exsection of a portion of the peronei tendons with most gratifying results. About half an inch of both peronei tendons is cut out, and the foot is forcibly replaced. It is striking to observe the entire disappearance of the spasm. When the patient walks about there is no sign of a return of it. Precisely why exsection is more efficient than simple section is not known, and in the absence of more definite information as to the nerve endings in tendons, and their bearing on the tension of muscles, speculation on the *modus operandi* of the cure is hazardous and unprofitable.

(3) When a flat foot has existed for such a time that the relationships of the bones are profoundly altered, the whole foot is rigid, and there is apparently ankylosis of the mediotarsal articulation, operations on the bones are called for. The usual form of operation is to exsect the astragaloscaphoid joint and wire the bones together. But, in very severe cases, a relapse follows, and the condition is soon as bad as ever. Both in the less and more severe forms, relapse follows operations on the articulations, because the essential fact has not been grasped that, in addition to exsection, it is necessary to restore, or add to, the power of those muscles which maintain the arch of the foot.

In *American Medicine* (Vol. IX., No. 18, May 6, 1905) a very suggestive paper appears by H. Augustus Wilson and R. V. Paterson, entitled "The Combined Operation of Arthrodesis and Transplantation of the Tendon of the Extensor Proprius Pollicis for the Relief of Flat Foot." The writers state that their procedure has yielded better functional results than is possible by the use of arthrodesis alone. The combined operation offers no serious difficulties, and the results obtained are more certain and satisfactory. The operation is therefore advocated in all suitable cases. In order to secure the best results, before operation, the foot must be flexible and easily over-corrected. Forcible manipulation will usually secure this. One of the most important requisites of all is that, as

in other operations of transplantation of tendons, the tendon must be united to its new attachment under proper tension, so as to ensure its subsequent action and tone, and therefore to enable it to give the greatest possible added support to the arch of the foot. Unless this is done, mechanical loss of power, atrophy, and decreased support will surely follow. The after-treatment requires particularly careful attention, and while a reasonable amount of development of the transplanted muscle may be expected, such a result is only to be obtained by gradually increasing the function of that muscle. It is, therefore, important to avoid sudden strain and excessive use of it at the beginning, for it is not rational to expect transplanted muscles to take on new work, if it is thrown upon them suddenly. Fatigue will cause degeneration, and the muscles will become weaker than before. The writers, therefore, advocate that, at the time of operation, the foot should be placed in plaster of Paris, and kept there for three or four weeks, and then such gymnastic exercises should be carried out as will develop the muscles of the foot, and of the extensor proprius pollicis in particular. Massage will be of service, and the use of electricity is beneficial.

The operation is performed as follows :—"An incision three inches in length is made, beginning at a point one inch below the base of the internal malleolus, and extending forward over the tubercle of the scaphoid on a line drawn towards the internal surface of the great toe. The bleeding from the superficial veins is then controlled, and the astragalo-scaphoid articulation is exposed. This joint is then opened from its internal aspect, and with a chisel the articulation is completely destroyed by removing the cartilages and a sufficiently large wedge-shaped piece from either bone, until, with accurate approximation, the desired arch of the foot is obtained, in fact the normal arch of the foot should appear. Then dissect up the skin above the incision, and locate the tendon of the extensor proprius pollicis, and open the sheath. The tendon is then caught with a hook from the wound, and a subcutaneous tenotomy is performed just above the metacarpo-phalangeal articulation. This latter step enables the tendon to be drawn out from the open wound. To the end of the tendon is attached a strong silk ligature by means

of a clove-hitch. With a drill bore through the scaphoid bone just far enough from its internal superficial aspect to ensure an all-bony canal, and at such an angle as will, with the foot in a corrected position, be in line with the action of the tendon. This will be found to be at $37\frac{1}{2}^{\circ}$ from the vertical. A convenient form of bone-drill to be used in this operation is one with a closely fitting tube or cannula, which follows the point of the drill in its progress through the bone. The drill is withdrawn, leaving the tube in place, and the tendon passed through the tube by means of a previously attached silk ligature. Withdraw the tube, cut off the tendon until one inch projects through the bony canal, split the end of the tendon, turn the split ends in opposite directions, and sew them to the periosteum on the plantar side of the scaphoid with fine silk, parallel with the line of the first incision, and at right angles with the direction of the bony canal. During the attachment of the tendon to the periosteum the foot should be held in the over-corrected position; and while so held, the tendon should be sewn to the periosteum under very moderate tension, after which the foot should be put up in the over-corrected position in plaster of Paris."

The function of the transplanted tendon is to give additional increased elastic support to the arch of the foot, to overcome the abduction found in flat foot, and to ensure the proper correlation of the muscular forces. As a flexor of the ankle, adductor of the front of the foot, and invertor of the sole, the action of the extensor proprius pollicis in its transposed position is greatly altered in quality; in fact it becomes for practical purposes a new tibialis anticus. The function of the extensor proprius pollicis, as an extensor of the first and second phalanges of the great toe is, of course, destroyed. This action is assumed, and compensated for by the inner tendon of the extensor brevis digitorum, which is attached to the outer border of the upper surface of the first phalanx of the great toe, near its base. If it be not desired to use the extensor proprius pollicis, the peroneus brevis can be employed, being brought across the front of the dorsum of the foot beneath the skin and deep fascia.

The recognition of the fact that, in flat foot, we must not only replace the bones, but also restore muscular power in such

a way as to cause inversion of the foot, with elevation of the arch, is a great advance in the treatment of spurious talipes valgus. Whether the restoration is made by means of boots, and by the employment of massage and electricity, or whether it is made by transplanting muscles, the principle is the same, and success is assured.

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CONGENITAL DISLOCATION OF THE HIP.

Since Lorenz brought forward his method of treating these cases without open operation, sufficient time has elapsed for workers who have followed in his footsteps to be able to express their opinion on cases, which have been treated on these lines, and both in Europe and America opinions, adverse and favourable, have been freely expressed. One great advantage of the publicity afforded to Lorenz's methods, by himself and his pupils, has been that a wide stimulus has been given to the consideration and treatment of the affection, and information has been afforded on certain points where it was badly needed.

The Orthopædic Department of the Boston Children's Hospital has issued a complete report (*Boston Med. and Surg. Jour.*, July 28, 1904) of all the cases of congenital dislocation of the hip, since it was realised that something

could be done for these cases. This report covers a period of twenty years, and is based on the observation of 144 cases. It includes ten cases, operated on by Lorenz, and it shows how success has added to success, and increased the field of usefulness of operations for this condition. Between 1884 and 1896, twenty-one cases were treated, seven by mechanical appliances without operation, twelve by open operation and curretting (two of them by Hoffa), and two by manipulation under an anæsthetic. All twenty-one were failures. Between the years 1896 and 1902, fifty-four cases were operated upon. Thirty-four of these were cut down upon, with eleven successful, six unsuccessful, and seventeen unknown results. Twenty were manipulated, with one success, seven failures, and twelve unknown results. In the year 1902, twenty-two cases came to operation. Of these two were operated upon by open incision, and were both failures. The remaining twenty were manipulated—half of them by Lorenz. The results were eight successes, two failures, three relapses, and seven transpositions. In the year 1903, thirty-three cases were operated upon, and, in twenty-four, an apparatus was used to assist in stretching. The Bradford apparatus is one by which traction can be made on the limb, at the same time that pressure is made directly on the trochanter major, after which a powerful pull is applied. Then the machine is abducted with the limb, and the head of the femur elevated direct into the acetabulum. Bradford, of Boston, has published a description of it (*American Journal of Orthopædic Surgery*, February, 1904), and attributes the success attained in many cases to the use of this mechanical contrivance. The results of the operations on thirty-three cases, in 1903, were sixteen successful cases, five transpositions, and three failures. Eight cases were manipulated, with six successes, one transposition, and one failure. One case was operated upon by the open method, and was a failure. Enough time has now elapsed to make these results trustworthy, and most of the cases have been verified by skiagrams and the careful examination of other observers.

The points to be deduced from these statistics are :—That there has been a steady gain in the success of the manipulative methods over the open operation, and as step by step is won

in overcoming the difficulties, it seems that a much larger measure of success may be looked for in future years.

A good deal of controversy has arisen on the question of priority of reduction of congenital dislocation of the hip by manipulation. Those who would belittle Lorenz's work, give to Paci of Pisa the credit of originating the operation, and are of opinion that Lorenz has added little to Paci's work. But this attitude arises from a confusion in the minds of those who criticise the methods of the two surgeons. The Lorenz reduction is accomplished by ultra-physiological abduction, the head entering the acetabulum over its posterior rim; whereas the Paci movements bring the head in over the inferior part of the acetabulum.

Horbath (*Zeitschr. f. Orthop. Chir.*, Band XII., Heft 4) has reported fifty-seven cases. Twenty-one were anterior transpositions, with good functional results; fifteen were still under treatment; ten were failures; nine cases relapsed, and eleven were lost sight of.

In any case, the result of the past two years' work seems to show that, in the future, the irreducible cases will gradually diminish to a vanishing point.

THE TREATMENT OF PARALYSIS BY TENDON TRANSPLANTATION AND ARTHRODESIS.

Dane and Townsend (*Jour. of Amer. Orthop. Assoc.*, August, 1904) have published a series of cases of paralysis of the lower limb, due to anterior poliomyelitis, operated upon by other surgeons, such a number of years having elapsed since the operation as to enable observers to accurately judge the results. The operations performed were tendon transplantation, arthrodesis, and astragalectomy. The results show that, except in carefully selected cases, tendon transplantation is not so satisfactory as astragalectomy and arthrodesis. In my (A.H.T.) opinion, the best results are obtained in the feet where tendon transplantation is combined with arthrodesis. Greater stability in standing follows from fixation of the joint, while the finer movements are increased by restoration of muscular balance. Hoffa (*Jour. of Amer. Orthop. Assoc.*, August, 1904) recommends that, in spastic contracture of the fore-arm, in order to overcome pronation, the pronator radii

teres shall be transformed into a supinator, by shifting its origin from the internal to the external condyle of the humerus. The comment on this procedure is that the muscle, so transformed, can never be anything more than a partial supinator, as it ceases to act effectually when the fore-arm has been drawn from the fully pronated position to the mid-position. He also advocates transplantation of the trapezius to the position of a paralysed deltoid in paralysis of the shoulder joint. By way of remark, it may be said that the writer of the present article has tried this on two occasions, and the results have not been particularly successful, the leverage obtained being too short.

Gibney (*Jour. of Amer. Orthop. Assoc.*) August, 1904) reports the removal of the tensor vaginæ femoris in a case of infantile hemiplegia, the object being to overcome the internal rotation, but the muscle is too small to have much influence.

NERVE GRAFTING.

The number of cases in which this procedure has been carried out for various forms of paralysis is steadily increasing. In this country Messrs. Ballance and Purves Stewart, Wilfrid Harris, Warren Low, Kennedy, and others, whose results are not yet published, have operated upon a fair number of what are deemed suitable cases, but the matter is still *sub judice*, and we must await final results before expressing definite opinions as to its exact value. We may say that the method promises well, and will give relief in a very distressing class of case.

Cushing (*Annals of Surg.*, May, 1903) has demonstrated that a return of power follows on anastomosis of the facial nerve in cases of facial paralysis. Young (*Ibid.*) has anastomosed the branches of the musculo-cutaneous with the nerve to the anterior tibial muscle for paralysis of that muscle.

COXA VARA AND FRACTURE OF THE FEMORAL NECK.

Whitman (*Jour. of the Amer. Orthop. Assoc.*, August, 1904) has insisted again upon the distinctions between fracture of the neck of the femur and epiphysial separation in early life. He divides the cases into three classes:—(1) Simple direct fracture of the neck, usually incomplete, occasionally complete. (2) Direct epiphysial separation, usually incomplete, in rare cases complete. These cases should be operated upon, and

the head replaced, whereas those of the first variety should be treated by putting the limb up in a plaster of Paris spica, with the leg drawn out to the limits of normal abduction.

(3) An indefinite class, in which the deformity is at, or in, close proximity to the epiphysial junction. Such patients are of the type, that have the so-called static deformities of adolescence, and injury is probably an aggravating, rather than a direct, cause of the distortion. Under this head, the true coxa vara is included.

Frölich (*München. med. Wochens.*, June 28, 1904) divides the cases into symptomatic and essential coxa vara. In the symptomatic class, there is hypertrophy of the neck, and the angle is very near the trochanter major. In the essential class, hypertrophy of the neck is absent, and the angle is near the head.

Codivilla (*Zeitschr. f. Orthop. Chir.*, Band XII., Heft 1 and 2) recommends osteotomy of the neck of the femur for coxa vara, but our experience shows that this is not sufficient in advanced cases.

ON THE NOMENCLATURE OF JOINT DISEASES.

There is probably no branch of surgery where so much confusion exists, and more especially in this country. The distinctions between the various forms of arthritis do not seem to be grasped. For example, what one surgeon means by "pseudo-arthritis," another calls "rheumatoid arthritis." And then we have chronic rheumatism, rheumatic arthritis, gout, &c.

Goldthwaite (*Boston Med. and Surg. Jour.*, November 17, 1904) furnishes us with a new nosology based upon the pathological condition of the joint. He divides non-tubercular arthritis into five types :—

1. Chronic villous arthritis, or dry joint. This is a local non-progressive condition, usually seen in the knee, and is associated with crepitation, or scraping, of the joint on movement, pain and tenderness, and occasionally increase in the synovial secretion. As a result, there follows weakness of the ligaments and the synovial and sub-synovial structures, with the formation of villi, and later either fatty or calcareous degeneration may take place, and bony or cartilaginous masses develop.

2. The second type is atrophic arthritis. The cause of this

is not known, but it is a progressive disease, resulting in crippling and distortion. The pathological basis is atrophy, involving the joint membranes, the cartilage, and the bones. It is often polyarticular, and the small joints are usually involved early in the course of the disease, more particularly the interphalangeal joints. They become affected with spindle-shaped swellings, pain and stiffness, distortion, and the joints ankylose.

III. The third type is hypertrophic arthritis. Thickening of the bones occurs, more particularly at the edges of the articular cartilages, or at the attachment of the ligaments. The formation of nodes, which ossify and limit joint movement, is an essential feature of this type, and, in the finger-joints, Heberden's nodes typify the process. The disease is often found in the spine, and results in spondylitis deformans. The effects of cold, strain and injury are often to be observed in this type of joint disease.

IV. The fourth type is infective arthritis, which varies in severity with the character of the micro-organism and infection. The changes at first affect the soft tissues of the joint, and may extend to the bones and cartilages, giving rise to destructive changes. The results are weak, unsteady joints, with or without dislocation, or if extension takes place to the cartilages and bones, true bony ankylosis results.

V. The fifth type is chronic gout, in which urate of soda is deposited in the soft structures about the joint.

It is a matter of hope that this rational classification, founded upon a sure pathological basis, will be adopted widely, and so become a means of throwing light upon the correct diagnosis of cases of deforming joint disease.

The appearance during the last two years of the *American Journal of Orthopædic Surgery* has given a great impulse to the study of this branch of surgery. The thoughtful and careful papers of our American *confrères* invite much reflection, while the focussing of the literature of Orthopædic Surgery all over the world into the pages of this journal, devoted to abstracts, is of the greatest assistance to busy workers. The journal is characterised by a remarkable thoroughness and accuracy in every particular.

Prize Essay.

THE TREATMENT OF EXOPHTHALMIC GOITRE.

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Two theories of the essential pathology of exophthalmic goitre have had a bearing on treatment, and of these the more modern, that of Möbius and Greenfield, is perhaps the more attractive. Struck by the resemblance between the symptoms of Graves' disease and the phenomena of thyroidism—a condition induced by excessive doses of thyroid gland substance,—Möbius suggested that Graves' disease is caused by a hypersecretion of the products of the thyroid gland, which products may or may not be identical with those formed by the gland in health. His theory received support from the microscopical discoveries of Greenfield, who showed that the condition of the thyroid, in exophthalmic goitre, is that of a gland hypertrophied, and secreting under high pressure.

The older theory, that of Trousseau, is also founded upon a resemblance, viz., the resemblance, borne by some of the symptoms of the disease, to the appearances produced by irritating the sympathetic nerve in the neck. Hence, Trousseau supposed that exophthalmic goitre is a "congestive neurosis," brought about by some disturbance of the sympathetic. The obvious objections to this explanation interfered little, if at all, with its influence on the treatment of a disease, which, in Trousseau's time, and for long after, offered no safer ground upon which to base treatment any more rational.

In any particular case of Graves' disease, we may have recourse to methods, founded upon either, or both, of these theories, as well as to methods, founded upon nothing better than an attempt to relieve symptoms. Speaking practically, the treatment of exophthalmic goitre resolves itself into:—

- (1) Treatment by rest; by general hygienic and tonic measures.

- (2) Medicinal treatment, by nerve sedatives, cardiac tonics, &c.
- (3) Electrical treatment.
- (4) Operative treatment.

It is well to remember that exophthalmic goitre is usually a chronic disease lasting from three or four to ten, or even, it is said, twenty years; that it varies, from time to time, in severity; that it is liable to sudden acute exacerbations, sometimes so severe as to threaten death; that most cases slowly tend to get well; and that treatment is likely to hasten the amelioration, if not to bring about a cure.

Mild cases of Graves' disease, manifesting nothing but palpitation, nervousness, and irritability of temper, are probably commoner than is generally supposed. To ascribe these not very striking phenomena to their proper cause may enable us, not only to check the full development of the disease, but also to prevent such a disaster as that, to which these patients are liable, if submitted to a general anæsthetic.

Most of the cases, however, which come to us for treatment, though not dangerously ill, present symptoms so well-marked as to leave no room for doubt regarding the nature of the illness. At the other end of the extreme, come those cases seen during the "paroxysm" so vividly described by Trousseau, where the harassing nervous excitement, the racing heart, and the distressing dyspnoea are the forerunners of an attack of acute cardiac failure, which may carry the patient off.

It is obvious that each case must be taken on its merits, and that the rigour of the treatment must vary with the character of the symptoms.

(1) *Rest*, mental and bodily, is of prime importance. Every endeavour should be made to avoid emotion, for whatever the origin of this disease may be, there is no doubt that those afflicted with it are made worse by any kind of mental excitement. If the patient is a man, he must lay aside active business for so long as the symptoms show that the disease is active. In the milder cases, certain restrictions as to the length of his working-day may suffice to prevent the advance of the disease. He should go to bed early and rise late. He should take frequent and restful holidays. He should shun anything of the nature of rush. In the case of women (among

whom the disease is more common, but, it is said, less dangerous), household and social duties should be reduced to the minimum. The condition of the uterine and ovarian functions should be investigated, and, if abnormal, rectified. There is a close physiological connection between the thyroid and the genital organs. It would also seem as if there were at times some connection between the nasal mucous membrane and exophthalmic goitre, for it has not infrequently happened that the cure of a hypertrophic rhinitis by the cautery, or in some other way, has been followed by the disappearance of the more serious disease.

In the more severe cases, and during periods of activity or exacerbation, the patient should be kept in bed in a well-aired, bright, quiet room. When these advantages cannot be obtained in the patient's home, she should be removed to a hospital or nursing home. The patient should be kept in bed so long as the pulse-rate in the horizontal position is 110 per minute or more, for the pulse-rate is usually an indication of the degree of severity of the other symptoms.

Dieting.—The diet should be full and nutritious, due regard being had to the state of the digestive organs. Emaciation may necessitate over-feeding, but caution must be exercised, for there is frequently, in these cases, a tendency to catarrhal dyspepsia and diarrhoea.

(2) *Medicinal Treatment* is advisable during all stages of the disease. The drug which has for many years been the mainstay of the physician in Graves' disease is belladonna. Doubtless it owes many of its beneficial qualities to the fact that it is a powerful and reliable nerve sedative, but, in addition to that, it probably acts by diminishing the excessive thyroid secretion. It should be given in doses sufficiently large to produce dryness of the throat. Cases of apparent cure from the use of belladonna have been reported, but, in exophthalmic goitre, great care should be exercised in estimating the value of any line of treatment, for this disease naturally undergoes many vicissitudes, and a change for the better, ascribed to a remedy, may be nothing more than a coincident lightening of the symptoms from unknown natural causes. Along with the nerve sedative, it is usual to combine a heart tonic. Perhaps the best for all purposes is strophanthus.

The earlier writers advised a dose of 2 minims of the tincture, but it is quite as safe, and more efficacious, to use larger doses. One may begin with 8 minims three or four times a day, and rise gradually to the full dose, watching the effect on the pulse. When the suitable strength of the belladonna and strophanthus mixture has been ascertained, it may be continued so long as any hope exists of benefit resulting from it. If no improvement appears, digitalis may be substituted for the strophanthus. Digitalis was Trousseau's favourite drug. He administered it with a bold hand, especially during the paroxysms of dyspnoea and cardiac distress, when he gave 8 or 10 minims of the tincture every hour. One of his cases took without harm 109 minims in 10 hours. Under such conditions, the cumulative effect of the drug need not be feared. When digitalis is used for prolonged periods, however, due attention must be paid to the well-known rules, which guide us in the administration of this remedy. Should belladonna fail or be inadmissible, if, *e.g.*, diarrhoea is a feature of the case, the bromides may be used in combination with the heart tonic.

The anæmia of Graves' disease is probably to be attributed to the toxine, which causes the other symptoms, hence it may be expected to improve with the improvement in the case as a whole. If it is thought necessary to treat this symptom independently of the others, then arsenic rather than iron should be tried. Von Graefe and Trousseau both found iron harmful, especially when there was much vascular excitement, and when the pulse-rate was over 100 or 110 per minute.

Ergot has been strongly recommended, but, in the experience of the writer, it has proved quite useless. Phosphate of sodium is praised by Kocher. Opium occasionally proves serviceable, it is said, when given in small doses over a long period, and it may be necessary for insomnia when other remedies fail, but we should not run the risk of setting up the opium habit in the vain hope of curing the disease by a prolonged administration of this drug.

Iodine, introduced into the system in any of the numerous ways, which have proved successful in simple goitre, has received an extensive trial in Graves' disease. In the form of iodide of potassium, at all events, it may conceivably be

of value in reducing the vascular excitement, but if used at all, it should be closely watched, for, since exophthalmic goitre is probably due to the overaction of the thyroid, then the iodides, which stimulate the thyroid, or supply to the economy an element which is obtained from that gland—thyroid colloid contains a large proportion of iodine—may be expected to be harmful. In this way, we may explain Trousseau's experience that the use of the iodides often produced acute paroxysms of the disease. On the other hand, some writers report great improvement from iodine. An observer so careful as Murray, of Newcastle, *e.g.*, recommends the inunction of the red iodide of mercury ointment over the thyroid as in simple goitre. In this connection, it may be observed that now and again we hear that cases of Graves' disease are made worse by residence at the seaside, presumably from the iodine in the air. For this reason, the sea-coast should not be advised as a health-resort in exophthalmic goitre.

The continuous application of the *ice-bag* over the precordium, or the thyroid and lower part of the neck, should be employed in all severe cases. Osler has seen the pulse-rate reduced by this means, together with rest in bed, from 140 to 90 per minute, and Trousseau found it of great value in the acute attacks.

(3) *Electricity*.—The sympathetic disturbance theory gave rise to the electrical treatment. The rationale, to treat an already irritated nerve by further stimulation, seems absurd, but the results are frequently good, probably because the stimulation affects the vagus and not the sympathetic. Recently F. B. Bishop has advised that, in order to ensure that the vagus alone is stimulated, a slighter current should be used than is theoretically necessary to reach the sympathetic. A weak continuous current is employed. Bishop electrifies both sides of the neck simultaneously. From a battery of 4 or 6 Leclanché cells, furnishing a current of 2—3 milliamperes (Cardew), a large sponge electrode, attached to the positive pole, is applied high upon the nape of the neck. To the negative pole, two small sponge electrodes are connected, by means of a double cord, and applied low down in front of the neck over the course of the vagus. Each *séance* should last from 10 to 15 minutes, or until a quietening effect on the pulse is

observed. This should be repeated daily for six months. The method may be varied by applying the kathode terminals over the thyroid, or over the eyelids when the exophthalmos is considerable. In a case recently under the care of the writer, electricity, used in the manner described, reduced the pulse-rate at each application by 10 per minute. Many cases however, receive no benefit from the electrical treatment, and it has the disadvantage of requiring a prolonged period for an efficient trial.

Serum Treatment.—Attempts at specific treatment by serums, quite a modern development, have so far been unsuccessful. The most recent is that of Murray, who fed rabbits with thyroid, in the hope that anti-bodies would thereby be formed in the animal's blood. Serum obtained from this source was given to patients suffering from Graves' disease, but the results were negative.

Treatment by feeding with thyroid-gland substance should be avoided. Some successful cases have been reported, but it is more likely to do harm.

Thymus feeding has also been tried, without definite success, the favourable reports of some observers being countered by the disappointing results of others.

The internal administration of adrenalin deserves a trial, as its physiological action may be calculated to counteract some of the symptoms.

(4) *Surgical Treatment.*—The operations most favoured aim at reducing the quantity of thyroid secretion formed, either by tying the principal arteries of the gland, and so inducing atrophy, or by a partial thyroidectomy. The most favourable cases for operation are those, in which the enlargement of the thyroid has preceded the other symptoms. Kocher regards established cases, where emaciation is extreme, and a high degree of tachycardia is present, as unsuitable. It was soon found, when operation was first attempted in exophthalmic goitre, that the mortality within the first few days after operation may be very high. This arises from two causes. Firstly, persons suffering from Graves' disease stand a general anæsthetic very badly. Secondly, in nearly all cases operated upon, the symptoms become worse during the first ten days after the operation, and the patient may

die in consequence. This is explained by the supposition that the handling of the gland by the operator expresses a large, and sometimes overwhelming, quantity of its secretion into the circulation. Hence the operation should be performed under cocaine anæsthesia (the "infiltration" method) by a rapid operator, who has had experience of the surgery of goitre.

With regard to the comparative merits of ligature and thyroidectomy, the operators best qualified to judge (Albert Kocher and Theodor Kocher) prefer the latter when it can be carried out. Ligature is often performed as a preliminary to excision.

As the steps of the operation of tying the thyroid arteries are the same as for removal of a lobe, save that in the one case the operation ceases with the ligature of the vessels, the same description will suffice for both.

Partial Thyroidectomy for exophthalmic goitre is performed as follows:—A transverse curved incision is made in the lower zone of the neck over the most prominent part of the thyroid. After dividing the superficial veins between two ligatures, the muscles in front of the gland, cleared of skin and subcutaneous tissue, are drawn aside, without division if possible. The fibrous external capsule of the gland is then opened, and the selected lobe isolated, together with its vessels and bands of adhesion, by means of the finger or a blunt, flat probe passed round it. These vessels and bands are ligatured and divided. After the main vessels have been secured at their entrance into the thyroid, the lobe is free save for its attachment to the other lobe by the isthmus. This attachment is seized and crushed by strong catch-forceps, and its vessels tied. The course of the recurrent laryngeal nerve must be avoided during the operation.

With regard to the results of this treatment, varying accounts are to hand, but on the whole, in cases where attention is paid to the points already indicated, they are distinctly hopeful. Of 59 cases of exophthalmic goitre operated upon by Albert Kocher, four died in the first ten days, 39 suffered from an aggravation of their symptoms immediately after operation, but as time went on these symptoms disappeared. In all, 45 cases were cured, and the rest improved.

Division of the sympathetic nerve on one side of the neck has been tried, but too little is known of the results to enable us to form any estimate of the value of the operation.

While surgeons naturally prefer cases for operation, which are not too far advanced, or where the disease is quiescent, it would be unwise, as things are at present, for the practitioner to recommend surgical measures until all other methods of treatment have proved vain, and the operation to be selected should either be ligature or thyroidectomy, or the combination of both.

Accidents and Complications.—As we have seen, paroxysms of dyspnoea and excitement are not uncommon events. Perhaps the quickest and most certain remedy for the ordinary paroxysm is half a grain of morphia hypodermically. The ice-bag should always be used. Trousseau's plan, which consisted, as we saw, of giving large doses of digitalis at short intervals, may be tried.

If it is clearly seen that the dyspnoea is due to pressure of the enlarged thyroid on the trachea, then it may be deemed necessary to perform tracheotomy. But, in all cases where operation is to be performed, it will be wiser, if the condition of the patient permit, to relieve the pressure, and, at the same time, improve the patient's chances of complete recovery by performing a partial thyroidectomy.

Insomnia is a frequent and annoying occurrence. As a rule, the milder hypnotics—trional, sulphonal, or chloral and bromide—will be found helpful. Some cases require morphia.

When acute mania appears, it is of evil omen. The sedative most likely to subdue the violence is hyoscine hypodermically.

In cases where exophthalmos is extreme, corneal inflammation may appear, and it may be desirable to protect the eye by the operation of tarsoraphy. This consists in uniting the margins of the upper and lower lids in the neighbourhood of the external commissure so as to reduce the size of the opening of the eyelids. In ordinary cases of exophthalmos, a bandage applied to the eyes at night will suffice to keep the lids closed.



FAMOUS HOSPITALS AND MEDICAL SCHOOLS.

THE EDINBURGH MEDICAL SCHOOL.

II.—THE MEDICAL FACULTY : SURGERY, MEDICINE, AND MIDWIFERY.

(Concluded.)

[With Plates XXIX.—XXX.]

*The Rise of Surgical Teaching.*¹—At first a knowledge of surgery was acquired almost exclusively in the wards of the Infirmary, systematic instruction being relegated to a few lectures introduced into the anatomical courses. In the introduction of specialised teaching of surgery, the College of Surgeons, as they had done on other occasions, gave the lead to the University. The first record of a surgery class, as we now understand it, is in 1772, when the college favourably recommended to students the lectures of Mr. James Rae, a surgeon to the infirmary, on the practice of which his teaching was based. Four years later, Rae followed the usual precedent, and, through the College, petitioned the Crown to establish him as Professor of Surgery in the University. Monro and the rest of the medical faculty, however, opposed this, and the Lord Advocate of the day, in refusing the prayer of the surgeons, quoted, as his reason for doing so, the opinion of the University, that the creation of such a chair would be "very improper." The College of Surgeons, undaunted by this failure, instituted in 1804 a chair of surgery of their own, to which Dr. John Thomson, already a private lecturer, was appointed. By obtaining from the Town Council, in 1777, a new commission, explicitly recognising him as Professor of Surgery and Anatomy, Monro obstructed the erection of a Chair of Systematic Surgery for his own lifetime and part of that of his successor, and until 1831, when the Crown founded

¹ For many of the facts as to the development of the medical faculty the writer is indebted to Grant's *Story of the University* and Bower's *History*.

a chair, the College of Surgeons maintained the only professorship of surgery in Edinburgh.

Although the first attempt of the surgeons was forty-five years in bearing fruit, the teaching of surgery in the University did not remain entirely in the hands of the anatomists during the whole of that period. Another extra-mural lecturer, James Russell, who had taught clinical surgery for 17 years, petitioned for recognition as a professor, and succeeded where Rae had failed, for in 1803 the senatus, after conferring with the managers of the Infirmary, reported favourably on the proposal, provided that the occupant of the new chair did not give lectures on systematic surgery. Thus, all that the Monro's conservatism did was ultimately to give the University two, and for a time three, instead of a single chair of surgery.

The next act in the struggle resulted from threats of the Senatus to put a stop by legal remedy to the alleged infringement of their prerogative of teaching by Thomson, the College Professor. Thomson had friends at court, however, and gave a quietus to the proceedings, by obtaining from Fox a commission as Professor of Military Surgery in 1821. This chair was but short lived, for, on the death of its second occupant, Ballingall, it was transferred by the Crown to Netley. Thomson, however, was not only a surgeon, but was keenly interested in medicine and pathology, and on Gregory's resignation of the Chair of Practice of Physic, offered himself as a candidate, but was defeated. Thereupon he retired to extra-mural life, to deliver courses on medicine and pathology, and to urge on the Government the need for Chairs of Pathology and Systematic Surgery. In 1831, he saw both his objects gained, and himself nominated to the former, with his friend John William Turner, who had succeeded him at the College of Surgeons, as his colleague in the latter office. Thomson's career is thus a striking one—extra-mural lecturer, then special Professor of Surgery, Regius Professor of Military Surgery, Lecturer on Medicine, and finally Professor of Pathology, the erector and first occupant of two successive university Chairs.

Among extra-mural lecturers on surgery about this period were Lizars, Aitken, and Liston, who, however, also taught anatomy. Thus, although surgery was regarded as a special subject extra-murally at a time when the University thought

an irregular course of afternoon lectures by *Monro tertius* sufficient, the College lagged eight years behind the University in taking the final plunge, and did not wholly dis sever the two until 1839.

The subsequent course of events must be hurriedly reviewed. Russell, the first Professor of Clinical Surgery, had no beds in the Infirmary, and his prelections were emasculated by the impossibility of criticising cases not under his own care. At the age of 81, he offered his chair to Liston in exchange for a life annuity of £300, an offer which Liston refused.¹ On this Russell turned to Syme, who, having abandoned anatomy, and, through his feud with Liston, having been refused election to the staff of the Infirmary, had started a surgical hospital of his own in Minto House, and developed there a successful system of clinical teaching. Needless to say, Syme accepted, and lectured without a peer for 21 years until 1869, when he was succeeded by his son-in-law, Joseph Lister. In the Chair of Systematic Surgery, Turner was succeeded by Sir Charles Bell, who died in 1842, and was followed by Millar, and in 1864 by Spence. The extra-mural teachers of surgery became increasingly numerous with the growth of the school, as the custom arose for practically every member of the surgical staff of the Infirmary to lecture either clinically or systematically.

The Teaching of Medicine and Midwifery.—We must now revert to the earlier days of the medical faculty, and trace the development of the other branches of study.

The Institutes of Medicine.—The case of physiology is somewhat peculiar. In Scotland the rather indefinite title of "Institutes of Medicine" is given to the Chair from which the subject is taught. The reason for this is that, in the University, it was regarded as an appanage of medicine—the theory, as opposed to the practice, of physic, and the professor was consequently a physician, while outside the University walls physiology was taught by the anatomists, and remained in the hands of the surgeons. In 1724, the Town Council wished to supplement the surgical and anatomical teaching of *Monro*, and accordingly established a professorship of the Institutes and Practice of Medicine, to which Porterfield was appointed. He was a man of independent means, and appears to have resigned without ever having tested his lecturing powers, for,

¹ No pension fund existed at that time.

about 18 months later, four physicians, Rutherford, Sinclair, Plummer and Innes, who at the date of Porterfield's appointment had received the town's sanction to cultivate pharmaceutical plants in the neglected College Garden, and to set up a chemical laboratory there, petitioned the Town Council to appoint them Professors of Medicine. They had already been giving extra-mural lectures on physic, and the Council, looking on their request as reasonable, made Sinclair and Rutherford, Professors of the Theory and Practice of Medicine, and Plummer and Innes, Professors of Medicine and Chemistry.¹ In practice, Plummer lectured on pharmaceutical chemistry, Rutherford and Innes on the practice of physic, and Sinclair on the Institutes of the theory of Medicine. The next Professor of the Institutes of Medicine was Robert Whytt, chosen in 1747. He was a transcendental physiologist, and taught that vital processes were due to an unconscious sentient principle, in opposition to the Stahlian doctrine of the rational soul. His writings on the subject were admired, though controverted, by Haller ; but of more interest than these metaphysical speculations (and probably more potent to advance the fortunes of their author) were his treatises on the cure of stone, which were occasioned by the Government's purchase of Joanna Stephens's secret remedy for an ailment which was then tormenting Robert and Horace Walpole. After Whytt, in 1766, came Cullen, who was transferred from the Chemistry Chair, which he had received ten years previously on the death of Plummer. Soon after this, Cullen petitioned successfully to be allowed to lecture alternately with Gregory on the Practice of Physic and the Institutes of Medicine ; and on Gregory's death in 1773 he succeeded to the Chair of Physic. The subsequent Professors of Physiology were Drummond, who never acted, James Gregory (1776-1789), Andrew Duncan, sen. (1790-1819), Andrew Duncan, jun., who held office for two years only, and then accepted the Chair of Materia Medica, and Alison (1821-1842), while, coming to recent times, we have Allen Thomson, Bennett, and Rutherford. Gregory came of a teaching stock. His father, grandfather, and great-grandfather before him had been professors, while twelve others of his kin and name had

¹ Prior to this, Crawford, a pupil of Boerhaave, had been appointed Professor of Chemistry in 1713. He was also professor of Hebrew, and, save for this somewhat remarkable plurality of office, little is known about him.

PLATE XXIX.



Exterior of Old University, Edinburgh.



Quadrangle of Old University, Edinburgh.

PLATE XXX.



Surgical Hospital, Old Royal Infirmary, Edinburgh.



Minto House.

borne the same title. Christison relates that Gregory gave his students the impression that, in acute diseases, nature must be coerced by drastic remedies—bleedings, affusions, purges, emetics, and blisters. Of Gregorian physic the mixture which bears his name is the only relic. Andrew Duncan, sen., did much for medical Edinburgh. He founded the Royal Dispensary, the Royal Asylum, the Harveian Society; he edited the *Medical and Surgical Commentaries* until it became the *Edinburgh Medical and Surgical Journal* under the management of his son; he had been in the habit of giving a weekly lecture on medical jurisprudence, and in 1807, despite the opposition of the Senatus, he succeeded in founding a Chair of the subject. The most famous occupant of this chair was Sir Robert Christison (1823-1832), who vacated it for that of *Materia Medica*. On the retirement of the late Sir Douglas Maclagan, the Chair was subdivided into one of Medical Jurisprudence and one of Public Health.

Outside the University, the course of matters was different. Not for 70 years after the Chair was erected was there a separate extra-mural class of physiology, until John Allen (1794-99) gave a private course on the subject. Ten years later Gordon, an anatomist, began to separate his anatomical from his physiological discourses; but only in 1838, when a formal course was made compulsory by the College of Surgeons, were the two sciences completely divorced.

The Practice of Physic.—We have seen how, in 1726, four professors of medicine and allied subjects had been appointed, and how two of them chose as their sphere the practice of physic, and the others pharmaceutical chemistry and physiology respectively. With the Chair of Anatomy, four of the subjects of the medical curriculum were now provided for (or five, if we include the quasi-honorary professorship of botany). On the same day, moreover, another Chair was added—that of Midwifery—bringing the number to six.

Of Innes, who, with Rutherford as colleague, filled the first Chair of Medicine, little is known. Rutherford ("slow, but absolutely sure," though that respectable authority, the writer of *Buchan's Domestic Medicine* calls him) had the merit of at once seeing the need for clinical teaching as soon as the Infirmary was made available for that purpose in 1746. He was jealous of his great colleague Cullen, and, though

anxious to resign, would not do so in the latter's favour, but secured as his successor John Gregory, whose son James has already been referred to as professor of the Institutes of Medicine. Cullen, however, succeeded in coming to an arrangement with Gregory, whereby the two lectured alternately on the institutes and practice of physic. After the death of the latter, Cullen adorned the chair alone. Apart from his reputation as a physician, he did the University good service by originating the first *statuta solemnia* regulating the granting of medical degrees. When Cullen retired, James Gregory took his place, and taught the practice of physic until 1821, thus serving the University for 45 years. On Gregory's death, the chair was keenly contested by Abercrombie, Home, and Thomson. According to Christison, the decision was come to on political grounds, and Home, the Tory, overthrew Thomson, the Whig. That his defeat drove Thomson from his Chair of Military Surgery to extra-academic exile has already been stated, but his revenge came when, during the Whig ascendancy, he induced Fox to make him professor of pathology. Home had been a most successful teacher of *materia medica*, but his translation from one Chair to another, at the age of 63, did not turn out a success. On his death, the curators again looked to the chair of the institutes to supply a professor of the practice of physic, and found there Alison, the brother of the historian, and an eminent philanthropic reformer of the poor-law as well as a scholarly physician; he held the post from 1842 to 1848, and was followed by Laycock and Sir Thomas Grainger Stewart.

*Clinical Medicine.*¹—There has never been a special Chair of Clinical Medicine, though proposals have at times been made, as in 1848, to found one. The arrangement originally was that one ward in the Infirmary was set aside for clinical teaching, and Rutherford was the first clinical professor. After him Cullen lectured, and later all members of the medical faculty, who desired to do so, were entitled to give discourses in rotation. In 1825, there was a proposal to hold two courses simultaneously, but the existing arrangement has been maintained up to the present, a certain number of wards being placed at the disposal of professors who teach clinically. At

¹ Prior to the erection of the Infirmary, the Dispensary of the College of Physicians had been utilised in an informal way for clinical instruction.

first, set clinical lectures seem to have been given only by the professors, but as time went the ordinary physicians followed their example, and thus gave rise to an extra-mural class of clinical medicine. Of the extra-academic teaching of the practice of medicine not much need be said. It will have been gathered from the narrative that not a few university professors were extra-mural lecturers before receiving Chairs; Andrew Duncan, sen., was one of the chief among them. In later times, as in the case of surgery, very many of the physicians on the Infirmary staff have lectured on the practice of physic.

*Midwifery.*¹—The creation of a Professorship of Obstetrics was an epoch-making event, for it took place at a time, when the conduct of labour was almost entirely relegated to midwives, trained for the most part only in the traditions of the mysterious sisterhood. Further than this, it seems probable that Edinburgh was the first University in this country, or on the Continent, to dignify obstetrics by erecting a special Chair of the art. The town council responded to the petition of Mr. Joseph Gibson, a surgeon, that he should be appointed professor of midwifery, in terms which showed that they not merely wished to add the subject to the medical curriculum, but also desired to regulate and licence the practice of midwives in the city. The council minute of February 9th, 1726, which recommended Gibson's nomination, also advised that in future all midwives should be registered, and that admission to the register should be guarded by the production of certificates of competency from two medical men. Of the double duty of making obstetrics an integral part of the training of students, and imparting instruction to the midwives, the latter apparently occupied most of Gibson's time, for there is no reason to suppose that he ever lectured to any but women. The new professor was the son of a surgeon practising in Leith. Prior to his election, he evidently had earned some renown as an accoucheur, and had written papers on the nutrition of the foetus in utero. By the terms of his appointment he was, however, neither a member of the Senatus nor of the medical faculty, but simply a city professor with a right to teach.

¹ *Vide* Professor A. R. Simpson's "History of the Chair of Midwifery," *Edin. Med. Jour.*, December, 1882.

Little is known as to Gibson's successor, Robert Smith (1739-1756). Hanoverian and Jacobite dissensions were rife in Scotland in his time, and, in so sultry a political atmosphere, science would wither rather than thrive. In the energetic hands of Young, the third professor, however, midwifery prospered. He first held classes for medical students, fitted up at his own charges a ward for lying-in women in the Infirmary, and utilised external cases for clinical instruction. In 1780, Alexander Hamilton was made conjoint professor with him, and ultimately succeeded to the Chair on Young's death. He founded the maternity hospital in 1791, and trained his son to be a worthy successor. James Hamilton was appointed in 1800, and his tenure of the Chair is rendered notable by the circumstances that he first gained for its occupant admission to the Senatus, and recognition as a full member of the medical faculty. It is difficult now to imagine any objection being raised to the teacher of that branch of medicine on which, more than perhaps on almost any other, the welfare of the race depends, having allotted to him a seat at the table of the Senatus, with the accompanying right of examining students before conferring on them degrees. Yet, in his memorial urging his admission to the ranks of that conservative body, Hamilton lays by no means so much stress on his position as a teacher of obstetrics, as that he alone of the professors was accustomed to give instruction on the diseases of children, and "the complaints to which the tender sex is subject." Midwifery, it would seem, was still, even in the first quarter of the 19th century, the Cinderella of medicine, so that the professor of the art must rest his claim for the recognition of his Chair mainly on the fact "that no man can now practice Physic with safety to the public without a knowledge of the diseases of women and children." Whatever we may think of the grounds on which he rested his case, however, it was through his pertinacity that midwifery first occupied its proper place in the medical curriculum. Hamilton died in 1839, and was succeeded by that versatile man of genius, Sir James Young Simpson.

Botany, Materia Medica, and Natural History.—We have now described the growth of the medical faculty along three main branches—anatomy, with its offshoots, surgery and pathology; medicine, with the institutes, medical jurisprudence, and

chemistry;¹ and midwifery. The remaining subjects cluster round the earliest founded Chair—that of Botany. After the Prestons came Alston, the King's botanist, who had studied under Boerhaave, and introduced *materia medica* into his course of lectures. He was followed by Hope in 1761, under whom the Chair was divided, the department of *materia medica* being entrusted to Francis Home, who, in 1798, resigned in favour of his son James, as popular an exponent of the subject as he proved unattractive after his translation to the Chair of Medicine. Home was followed by Andrew Duncan, jun. (1821–1832), the immediate predecessor of Christison. Two years after the creation of the *Materia Medica* Chair, Ramsay was made Regius Professor of Natural History, so that, by 1770, the faculty numbered eight professors—anatomy, botany, medicine, institutes, midwifery, *materia medica*, chemistry, and natural history. The Chairs of Surgery, Pathology, Medical Jurisprudence, and Public Health, which now bring it up to its complement of 13, have already been accounted for.

In treating of the later development of the medical faculty, the extra-mural school has, to some extent, been neglected; indeed, a continuous record of its teachers would be an impossible task. Enough has, however, been said to show that the medical department of the University, so far from dwarfing the growth of the school from which it sprang, fostered the spread of the latter, unfettered as it was by university restrictions, along broad lines, and various special branches of study, unrepresented in the University, find a place in the extra-mural school. In 1840, the town council allowed students to take some classes extra-murally—a rule the validity of which was contested by the *Senatus*, until settled in the affirmative by the House of Lords in 1847.

Qualifications to practice.—From 1726, when the medical faculty began to examine on its own behalf, to 1748, less than half a dozen Doctors of Medicine were capped annually. The number rose by the end of the century to 50, and in 1827 the high-water mark (prior to the Act of 1858) was reached with 160 graduates. By the *Statuta solemnia* of 1767, the prescribed course of study comprised classes in anatomy and surgery, chemistry, botany, *materia medica*, and medicine. In 1783 the

¹ Up to 1844 Crawford's successors were described as professors of medicine and chemistry, thereafter of chemistry only.

course was fixed at three years. In 1825 midwifery, practical anatomy, natural history, medical jurisprudence, clinical surgery and military surgery were added, and the duration lengthened by a year. The modern system of examinations dates from 1833; no better idea of that in vogue previously, with its Latin theses, defended comments on the Hippocratic aphorisms, and private oral examination, all veiled in a dead language growing daily less capable of expressing the advances of science, can be gained than from Sir Robert Christison's experiences, as told in his Autobiography. The account is too long to quote in full. At one part of his trials he had successfully evolved from his inner consciousness the description of a new instrument for removing concretions from the stomach, only to be met by Monro's dubious query "*Vidistine unquam, Domine, tale instrumentum usitatum?*" To which Robert boldly replied in doubtful Latin "*Nec vidi, nec audiui,*" and emerged triumphant from the ordeal.

Of licences to practice other than university degrees, that granted by the College of Surgeons was the most generally popular in Scotland. The licence of the College of Physicians was originally granted, in terms of its charter, without examination to university graduates, and to them only. With the passage of the Medical Act of 1859, the College resolved, after years of keen discussion, to admit licentiates who had not previously obtained university degrees, and one of the regulations, under which this was done, provoked much hostile criticism from different quarters, and led to considerable misrepresentation of the value of Edinburgh medical qualifications generally. This regulation was that governing exceptional admissions, without examination, during a Year of Grace, which was intended to inaugurate the new era in medical practice by extending to men of mature age and good professional standing the privilege long enjoyed by university graduates of entering without examination. Of the wisdom, or unwisdom, of this step there may be room for question, but it cannot be too clearly stated that the College adhered strictly to the letter and spirit of their law, and admitted only established practitioners of repute, and that only for one year. With this single exception, the two Colleges have always demanded as stringent a test from candidates as the Universities have done.

Notes by the Way.

The Tuberculosis Congress.

THE Tuberculosis Congress was in the conventional phrase a success, and doubtless it has helped the cause, which it was intended to promote, by calling public attention to the standing menace which consumption is to human life, and to the progress of the race, and to the necessity of the co-operation of the State and the people with the medical profession in combating the evil. There was too much preliminary oratory, and the programme of every section was overloaded with papers, a large proportion of which, perforce, remained unread. In what was actually got through, matters of national, rather than of scientific interest, were somewhat too prominent. All these things are practically inevitable at these vast gatherings, and after all, no great harm is done, for the chief utility of congresses is that they bring together workers from all parts, and thus enable them to learn each other's "personal equation." This knowledge is needed for a right estimate of the value of scientific research, at least as much as it is in fields, where the human element might at first sight seem to have freer play. The medical profession is still to a large extent under the sway of great names, and it has often been led astray by too ready belief in the words of those, whom it has accepted as authorities.

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Sensationalism in Medicine.

As an example of this evil influence in recent years, we need only recall the tuberculin fiasco in 1890. It would doubtless be rash to place the newest remedy for consumption in the category of failures, till it has been fully tried and found wanting. The name of the man, to whom medicine owes anti-diphtheritic serum, is a guarantee of sound work. This makes it all the more deplorable that Professor von Behring should have announced his discovery of a specific for consumption in a manner contrary to the best traditions of the medical profession. An instance of commercialism, naked and unashamed, so glaring that it scandalised even the newspapers, is a public dishonour to

medicine. We cannot help thinking that German science has caught some of the advertising spirit, now so manifest in some of its professors, from a ruler the breath of whose nostrils is sensationalism. It is well known that it was to gratify this passion that Koch was forced into premature publicity, and it is significant that in connection with Professor von Behring's cryptic communication to the Tuberculosis Congress, stress was laid in quarters apparently inspired, on the fact that he enjoys the confidence and friendship of the German Emperor. It is earnestly to be hoped, in the interest of mankind, that he will be able to make his claims good. But, even if he does this, he can hardly be acquitted of having helped to lower a profession, whose distinctive feature is altruism, to the level of a trade, which reaps its profit from human suffering.

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**Are Diseases
Increasing?**

THERE can be no question that the prevalence of certain diseases has increased during the last half century. Conspicuous among these are diabetes and insomnia, both of which are largely due to the mental stress of a harder struggle for existence. The increased consumption of alcohol, and the free use of narcotics are also responsible for many morbid conditions unknown to our hardier forbears. But, in comparing the present prevalence of diseases with that of the past, there are several factors for which due allowance is often not made. One of these is that our forefathers died, as a rule, at a considerably younger age than their descendants; if they did not perish by the sword, they were mowed down from time to time by the plague, or other devastating epidemics. In this way, they escaped many of the diseases not only of old age but of advanced middle life. Again, it must not be forgotten that each generation represented to a much larger extent than is now the case the survival of the fittest. Most of the weaklings died in childhood. The triumph of modern hygiene is, that it has preserved a large proportion of these lives; on this we may fairly pride ourselves from the humanitarian point of view, but we must not shut our eyes to the fact, that it has the serious drawback of lowering the general standard of health, and of sapping the vigour of the race. Another factor, which must be taken into account, in estimating

the prevalence of diseases, is our vastly greater power of recognising them. Discussing this question in an article which recently appeared in the *Nouvelle Revue*, Dr. P. L. Hauser says: "What then is the cause of the multiplication of disease? Is this multiplication merely apparent, being due first to the progress of natural science and then to the new knowledge which we have obtained with reference to pathology? While the fact of this new knowledge is indisputable this last hypothesis is insufficient to explain the absolute silence, maintained by the most distinguished physicians of past years, with reference to a great many of the diseases of our epoch. While biological science has made immense strides in recent years, we cannot deny to the physicians of ancient times a profound spirit of observation. Yet we look in vain for the least mention of diseases such as diphtheria, progressive locomotor ataxia, progressive muscular atrophy, Parkinson's disease, Basedow's disease, general paralysis of the insane, and the different sorts of cerebro-spinal sclerosis, all of which are frequent to-day."

Dr. Hauser's remark is surely too sweeping. A very fair description of diphtheria is to be found in Aretaeus. It is by no means safe to infer, because no mention is to be found in old writers of diseases of obscure and perplexing symptomatology, that they did not exist. This argument would equally prove that many other diseases are of modern development. Round ulcer of the stomach was so utterly unknown in the seventeenth century, that the discovery of the lesion at the post-mortem examination of the body of a royal princess was held to be a proof of poisoning, and for political reasons was explained away as the result of an awkward use of the scissors. Appendicitis again may be more common now than formerly, but we know that it did exist long before it was generally recognised, and it may fairly be assumed that it has existed since man had an appendix. Yet there is no mention of it in the ancient writers.

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The Etiology of
Appendicitis.

APROPOS of appendicitis, we have received from Dr. F. W. Gordon, late Honorary Surgeon to the Auckland Hospital, New Zealand, an interesting note on the causation of that most

fashionable of complaints. He says that two years ago he was making a lotion by breaking up a tabloid with a metal sound in an enamelled jug, and on pouring this into a glass vessel, through which the sun was shining, he was struck by the large number of sharp, jagged flakes, like glass flashing iridescent in the light, floating about in the fluid. These were evidently pieces of detached enamel. It at once occurred to him that they might cause appendicitis, and he is now convinced that probably 80 or 90 per cent. of cases are due to this cause. He argues that the increase of appendicitis has been parallel with the increased use of enamelled ware for domestic purposes in every household, rich or poor. Enamelled ware has steadily displaced most other wares in the kitchen during this time, and is now in almost universal use. It is, Dr. Gordon holds, reasonably conceivable that these microscopic chips and flakes from the wearing of enamel may, in the blind appendix, cut their way into the peritoneal cavity, allowing the admission of still more microscopical bacilli. Dr. Gordon's theory is not new, but for all that there may be some element of truth in it. Among other causes that have recently been put forward is that of septic teeth. On the other hand the tooth-brush is regarded by some with suspicion, as detached hairs have been found in removed appendices. The use of boric acid as a preservative in certain articles of food has lately been incriminated by one ingenious person, while another has fluttered the dovescots of vendors of mineral waters and other beverages by ascribing appendicitis to antimonial poisoning through the red rubber rings used as stoppers of soda-water bottles. The "bicycle habit" has been charged by a Washington physician with the production of the disease. Other sapient persons point to the coincidence of the increase of appendicitis, with the increased enthusiasm for golf, and other forms of outdoor sport. Even sitting cross-legged is believed by some to be a cause of the disease. It would appear that everywhere around us lurk possible causes of appendicitis. In these circumstances, the time may come when the removal of the appendix, soon after birth, may become as general a rule of hygiene as ritual circumcision is among the Jews.

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**Hygienic aspects
of Motoring.**

THE Society of Medical Officers of Health not long ago, with only a few dissentient voices, blessed the motor as an aid to health. One member saw in it means of reducing the mortality from infantile diarrhoea in towns, which he ascribed to the wholesale distribution of organic material. Another held that it improved the health of people, who used to suffer from the effects of indulgence, a ground of praise which, however just in a physical sense, may not altogether commend itself to the austere moralist. A third stated that the motor had cured him of bronchitis and asthma. We congratulate him on the result, but we cannot help thinking that the treatment must be used with certain precautions. We happen to be aware of cases in which motoring was the determining cause of severe attacks of bronchitis. Another misdeed, with which the motor has been charged, and which does not seem to have been noticed by the Medical Officers of Health is the effect on a delicate skin. After a drive a lady's face is often rough, red and corrugated to a degree sufficient to constitute an appearance to which the name of "motor face" has been given. The worst effect of motoring is doubtless what some French specialists call motormanía. The sense of rapid motion is always exhilarating. Did not Dr. Johnson say that travelling in a postchaise was one of the greatest pleasures in life? What would he say if he could ride in a motor on a level road where there are no police traps? But the exhilaration may be intensified to dangerous excitement and even to actual mania, and a naturally humane and law-abiding citizen has been heard to confess that when he was in that state he would drive over whatever stood in his way. This doubtless accounts for many accidents which seem otherwise inexplicable.

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**Railways and
Public Health.**

IT is a curious fact that railway travelling was at first regarded by the medical profession with suspicion as a possible source of danger to health. A London physician wrote in the early days of the *Cornhill Magazine* a terrifying account of the catarrhs and other respiratory affections, as well as formidable nerve disorders, that would be the portion of railway travellers. It is on record that, when the first railway was opened in Germany, the

Bavarian Medical Faculty solemnly delivered itself of the following opinion: "Conveyance by means of carriages propelled by steam ought to be prohibited in the interest of public health. For the rapid motion cannot fail to create a disease of the brain among the passengers, which may be classed as a species of *delirium furiosum*. Even if travellers are prepared to run the risk, the onlookers ought by all means to be protected. The mere sight of a passing train suffices to cause the same cerebral disorder. Wherefore the authorities should insist on having a palisading of thick boards at least five feet high, placed on each side of the permanent way." After this, one feels that Mr. Gladstone had really little cause for wondering that Pius the Ninth, in 1864, said he would never permit railways in his dominions, as he believed they would injure the health of his subjects. On Gladstone pressing him on the subject, the Pope said that he was "sure the English people were subject to consumption from passing through the air so rapidly in railways." Had the Pope ascribed the danger of infection in railway travelling to the countless microbes harboured in the carriages, he would not have been far wrong.

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ACTING upon the advice of their health officer, Dr. Ragan, the San Francisco Board of Health have placed this concoction of sulphurous acid, oil of vitriol, and Chicago water in the category of impure foods. As a consequence, the police department, acting in conjunction with the health department, have power to remove the stuff from the shelves of all dealers offering it for sale, and this exposing for sale constitutes in itself a punishable offence.

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THE result of the September competitions is as follows:—The best essay was sent in by Dr. John J. Wilson, of Anstruther, Fife; and the best answers by Dr. E. Allan Wilson, of Harrogate. Cheques have accordingly been sent to these gentlemen.



Practical Notes.

THE NERVOUS MECHANISM OF RESPIRATION.—The respiratory centre, or *nœud vital*, which governs respiration is located in the lowest part of the floor of the fourth ventricle of the brain, just above the calamus scriptorius, and about three or four millimetres below the vasomotor centre. This is the only true respiratory centre, and there are no subsidiary centres in the cervical region of the spinal cord, though their existence has been suggested. Those, which used to be described, are now shown to be simply the cell stations in the anterior cornua of the grey matter of the spinal cord, with which the efferent nerve fibres of respiration, which travel down the cervical region of the cord, arborise. It has been shown by Head that the respiratory centre is chiefly a reflex one, depending upon afferent impulses from the lungs for its proper working, and that these travel from the neighbourhood of the lung alveoli by the vagi to the respiratory centre. When the lung alveoli are in a condition of partial collapse, that is just after expiration, afferent impulses travel up the vagi, which stimulate the inspiratory portion of the respiratory centre, and inspiration occurs. When the lung alveoli are distended, that is at the end of inspiration, afferent impulses pass by the vagi up to the respiratory centre with the result that inspiration is inhibited, and the inspiratory muscles relax gradually, and expiration, which is chiefly due to the recoil of the elastic tissue of the lung around the alveoli, and of the chest wall, readily follows. Gad, however, in his experiments upon the mechanism of respiration, tries to show that the inspiratory portion of the respiratory centre is continuously tending to send down impulses, in order to bring about inspiration; but from the lungs, in a state of distension, there arise afferent impulses which inhibit the inspiratory process, and consequently expiration follows. It has just been stated that expiration is due mainly to the recoil of the elastic tissue of the lungs, and of chest wall; in emphysema, which is the common accompaniment of chronic bronchitis, the tissue of the lung loses, to a very considerable extent, this

elasticity, either because it has been badly put down, or because it has been improperly used, and subjected too frequently to prolonged strains, so that expiration must of necessity be very much prolonged. In certain circumstances, the respiratory centre is influenced by other afferent impulses than those from the lung; for instance, painful and cold sensations from the skin stimulate the inspiratory part of the centre. If a child just born does not breathe readily, a few painful stimuli, applied to the skin by means of a flick with a wet towel, will usually cause the child to cry, and to take a few long and deep breaths. It is found that in persons, suffering from acute opium poisoning, that the respiratory centre is at first unaffected, later it becomes depressed, the respiratory movements now become irregular, death is finally due to paralysis of the respiratory centre, and, therefore, to arrest of breathing. This to a great extent may be obviated by keeping the patient awake, and, with this object in view, he should be constantly kept on the move. At the same time, an excellent addition is to flick the exposed calves with a wet towel, or to apply the battery, using the Faradic current over the various branches of the fifth cranial nerve, where they become superficial on the face, so as to cause painful stimuli to travel up to the respiratory centre, and consequently to keep its inspiratory portion at work. There are other external stimuli, which influence the respiratory centre, such as those from the mucous membrane of the larynx. If the peripheral branches of the superior laryngeal nerve, which is the sensory nerve to the mucous membrane of the larynx, be stimulated, say by a particle of food getting into the larynx, then are produced forcible spasmodic expiratory blasts, such as coughing, in order to get rid of the offending substance. These stimuli from the larynx bring into action the expiratory portion of the respiratory centre. Spasmodic cough may be produced by reflex stimulation of the auricular branch of the vagus, through a plug of wax, or foreign bodies, lying deep in the external auditory meatus. Stimulation of the central end of the glosso-pharyngeal nerve causes inhibition of respiratory movements for a short time, and this accounts for the cessation of breathing during swallowing.

The respiratory centre, besides being a reflex one, is also

automatic in its action, depending upon a proper blood supply for its action. Should the composition of the blood plasma be altered by the presence of poisons such as occurs in uræmia, or the temperature of the blood be raised, then there is an alteration in this automatic action. If both the vagi of an animal be completely severed, so as to cut off afferent impulses from the lungs to the respiratory centre, respiration is found to be slower and deeper, though it continues, while the centre is now cut off from any impulses from the lungs.

The inspiratory part of the respiratory centre acts rhythmically. In a child, respiratory movements occur about 44 times a minute, but in the adult, as a rule, not more than 18 times a minute. This rhythm may be changed, respirations may become slower and deeper, until they stop suddenly, they then resume, with shallow respirations, which again gradually become much slower and deeper. This is known as the *Cheyne-Stokes* respiration, which may be observed normally in children during sleep, in hibernating animals, and in persons suffering from uremia. It also occurs when life is slowly ebbing away.

Two kinds of efferent impulses traverse the vagi nerves to the lungs, one of these is all-important in controlling nutritional changes, which take place in the lungs, the vagi are the trophic nerves of the lungs. When both vagi are damaged in a warm-blooded animal, death as a rule follows in ten days from trophic pneumonia. The vagi also are distributed to the unstriped muscle in the bronchial tubes and bronchioles, and these tubes, to a certain extent, regulate the amount of air which enters the lungs. In cases of spasmodic or bronchial asthma, there is, as a rule, a spasm of the unstriped muscle of the air tubes together with a hyperæmia of the mucous membrane, which is brought about by some reflex irritation on a somewhat over-sensitive bronchial mucous membrane. The dyspnoea, which occurs during these attacks, as a rule, disappears almost at once when antispasmodics are used. These may be administered locally, such as the inhalation of a little chloroform, which produces temporary relaxation of the muscles, or generally, when circulating in the body. The following remedies may be tried: inhalation of the vapour of amyl nitrite, or the fumes from stramonium and lobelia cigarettes, or

hot whisky with the addition of a little spirits of chloroform, will also bring about relaxation.

The following prescription, however, will be found useful for administering to patients suffering from spasmodic asthma :—

℞ Tincturæ Aconiti	-	-	-	℥ iij.
Tincturæ Belladonnæ	-	-	-	℥ viij.
Tincturæ Lobeliæ Æthereæ	-	-	-	℥ viij.
Tincturæ Aurantii	-	-	-	℥ 3 ss.
Aq. ad. ℥ j.				

Misce. Ft. Mist. Two tablespoonfuls to be taken every four hours.

Nitre paper, which is made with a strong solution of potassium nitrate, if burned and the fumes inhaled, will often bring about relief. Potassium iodide in doses of ten to fifteen grains, taken twice or three times daily, is said to act as a specific, and when taken between the attacks prevents their recurrence. At the same time all causes of reflex irritation must be removed.

GONORRHOEA.—There are two forms of urethritis, namely, the *simple* and the *infective*. The former may be due to an injury, such as that caused by the passage of an instrument along the urethra, or may be brought about by the passage of a small calculus from the bladder, or from the prostate gland. It sometimes occurs in elderly men, who are suffering from chronic gout, and it is then set up by a very acid urine. It may also be brought about by contact with a simple leucorrhœal discharge.

The latter type is due to direct infection with the gonococcus of Neisser, discovered in 1879, or with the diplococcus gonorrhœæ. In this case, the urethral discharge is thick and purulent, whereas, in the simple type of urethritis, the discharge is much thinner, and consists mainly of muco-pus. The only way of making absolutely certain of a diagnosis of the cause of the urethritis is by finding the gonococcus in the urethral discharge, and, with this in view, cover-glass, or film, preparations must be made with some of the discharge. In order to do this, a very thin film of the discharge is spread on the cover-glass which must be quite clean, and allowed to dry. The film is then placed for from five to ten minutes, in a

saturated solution of methylene blue, in a five per cent. solution of carbolic acid. The films are to be washed in water in order to remove excess of stain, then to be rinsed in weak acetic acid, and then again washed in water. They may then be stained with a weak solution of safranin or eosin which is a counter stain, dehydrated with alcohol, cleared with oil of cloves, and finally mounted in Canada balsam. The gonococcus does not stain by Gram's method, whereas most of the diplococci, with which it might be confounded, do retain the stain. Still cover-glass preparations may be treated by Gram's method of staining as follows:—The film is first placed in a solution of gentian-violet. The cover-glass is then immersed in a solution of iodine in iodide of potassium, which fixes the stain in the bacilli, but does not in any tissue elements present in the film. The film is then transferred to alcohol, decolorisation takes place, and the gonococci lose their stain. If a counter-stain such as dilute carbol-fuchsin is used, the gonococci become red, whilst most other cocci, for which they may be mistaken, are stained a deep violet colour. The organism is a bean-shaped diplococcus, and the two lie with their concave borders facing one another. Sometimes they occur in groups of four. As a rule, they are found *within* the polymorphonuclear leucocytes, or in the desquamated epithelial cells, though, in the discharge, most of the cells are usually quite free from micro-organisms. Still those which do contain gonococci, as a rule, contain them in abundance, moreover, it must be remembered that gonococci may be extra-cellular. We cannot emphasise too forcibly the importance of making a correct diagnosis, because a male patient, suffering from gonorrhœa, must be looked upon as a source of danger to himself, for the complications, which follow gonorrhœa, are far-reaching, and he is certainly a great source of danger to other people.

A leading article in the *Therapeutic Gazette* published last August calls attention to the serious and far-reaching effects, which can be, and are, brought about by gonorrhœa. All the leading American gynæcologists in their works on the subject emphasise the important part played by this infection in the evils wrought in the pelvic organs of women. They find that a very large proportion of the pelvic troubles met with in married women are due to this, at one time lightly esteemed, materies

morbi. Even 40 per cent. is looked upon as too small an estimate. Neisser believes that 45 per cent. of female sterility is due to this cause, while Nöggerath puts the figure at 50 per cent. Williams attributes 73 per cent. of all abortions to gonorrhœal endometritis. Bumm, on the other hand, proved that a large number of infected women conceive and bear children.

Clark states that 75-90 per cent. of the male population of large cities have suffered from gonorrhœa. Janet considers that this disease and tubercle are the two great pests of modern times. One of the leading gynæcologists in the States, Findley, goes so far as to doubt whether a man, who has once had the disease, should be allowed to marry. On this the *Gazette* remarks "this is undoubtedly an exaggerated view, although it serves to emphasise, and impress upon our minds, the important facts to which we have drawn attention."

Treatment of Gonorrhœa in Women.—In the *Revue Médicale* for May of this year, Dr. Perrin, of Lausanne, deals fully with the subject as affecting the lower genital tract in the female, but not including ovaritis, salpingitis, or pelvic peritonitis. The following are the places, mentioned in order of frequency of attack, and in which the disease is reputed to be hard to cure:—1. The urethra. 2. The endometrium of the cervix uteri. 3. In Bartholin's glands. 4. The endometrium of the uterus itself. 5. The vagina. Of these the disease is most persistent in the urethra, and in the cervix uteri.

Urethritis is at present treated by local injections, which, though of good effect in men, are not efficacious for the female urethra, in which injections cannot be held for any length of time. Medicated bougies, too, are of little use, because the theobromine melts and protects the mucous membrane from the active drug contained. Tampons can only give good results if frequently applied throughout the day. This treatment obviously leads to much irritation. Dr. Perrin has devised an instrument, which consists of a hollow silver rod 10 cm. long, with numerous small holes in the sides of the middle portion. It is closed at the inner end, but widened out at the outer end, so as to fit the end of a syringe. This is placed inside a silver tube the size of a sound 20-20 Charrière, surrounded by cotton-wool moistened with a solution of the drug to be


applied. Thus protected the whole apparatus is easily introduced into the urethra, and, when in position, the outer tube is withdrawn, leaving the impregnated wool in contact with the mucous membrane of the urethra. The cotton-wool may be kept moist by a syringe. Application should be made twice daily. It is found that the application is not in the least painful, and it is well borne even in the acute stage. Similar instruments, but somewhat shorter, may be applied to the cervix, 5 cm. long, and, for the body of the uterus, 7 cm. long. It is suggested that these should be left *in situ* for about fifteen minutes.

Treatment of Gonorrhœa in Males.—Sulphate of zinc and silver salts in the treatment of gonorrhœa. Dr. Juliusberg of Breslau, working under the observation of Professor Neisser, finds that zinc salts are untrustworthy in all stages of gonorrhœa, and, at times, he says they are even dangerous. Relapses always occur, and a chronic urethritis sets in, the final cure of which is prolonged and difficult. He strongly recommends treatment by *protargol* in the form of an injection of from a quarter to a half per cent. solution of protargol, with the addition of three per cent. antipyrin. The injection is to be used three or four times a day, and it is to be kept in the urethra from ten to fifteen minutes. If possible, once a day, the injection should be retained in the urethra for thirty minutes. This should be replaced when possible by an injection of a three per cent. solution of protargol with five per cent. antipyrin added, and this should be retained in the urethra for ten, twenty, or thirty minutes, once daily. The solution of protargol should be freshly made and cold. The syringe, used in the injection, should contain at least four drachms, and the patient must be taught to inject efficiently, and the urethra must be filled.

Dr. Ernest Runge reports favourably upon the use of *gonosan* in the treatment of gonorrhœa. It is put up in gelatine capsules each containing .3 grams of a combination of sandal-wood oil 80 per cent., and kava-kava resin 20 per cent. It is found that the urine, passed by the patients, who are taking this preparation, is capable of rendering virulent cultures of gonococci quite inert after five minutes contact. The usual dose is from six to eight capsules daily, and the administration

is quickly followed by the amelioration of the more urgent symptoms, such as the scalding pain in the urethra, and the bearing down sensation in the bladder. After two or three days, the discharge is much lessened, and loses its purulent character, becoming quite milky and viscid. It has been found however that the preparations cannot be quite depended upon for the complete cure of the discharge, and Runge was obliged to resort to local measures, such as injections of a weak solution of protargol, succeeded by a combination of the acetate of lead and sulphate of zinc. For the complete irrigation of the urethra, he prefers to use Fritsch's "celluloid insertions." These consist of a fenestrated tube with a solid olive-shaped end, the intention of which is to guard the bladder against the back flow of the injection, as the olive-end is firmly gripped by the internal sphincter, but the urethra can be thoroughly irrigated.

Dr. G. Merzbach, of Berlin, in the *Therap. Monatsch.*, mentions the following facts with regard to the use of gonosan :—1. It must be taken directly after meals, when it is easily taken without any unpleasant taste, and without disturbance of the alimentary canal. 2. It does not induce any irritation of the kidney even in large doses. 3. It quickly lessens the discharge from the urethra. 4. It has pronounced diuretic properties. 5. It limits the growth of the gonococci. 6. It has an anæsthetic effect in soothing pain, especially that which occurs on micturition, and it reduces strangury. 7. It has an anaphrodisiac effect and prevents chordee and emissions to a certain extent. Dr. Merzbach also diets his patients strictly, and recommends the injections of weak solutions of silver nitrate to be made by the surgeon, but orders for the patient's own use injections of 1 to 2·5 per cent. solutions of protargol, with 1 to 2·5 per cent. glycerine and ·6 per cent. solution of sodium chloride. The injections are to be used six times daily, and each is to be retained for at least six minutes.



NOTES FROM FOREIGN JOURNALS.

TREATMENT OF INOPERABLE CANCER OF THE UTERUS.

In the *Revue pratique d'Obstétrique* Dr. Récamier writes on this subject. For hæmorrhage he advocates plugging with sterilised gauze. *Adrenalin* solution (1°/100) must be used with care. It is usually employed at "Le Calvaire," (a retreat for cancer cases), for hæmorrhages from large ulcers, but it has given rise to trouble on several occasions on account of the interference with the peripheral circulation, resulting in great pallor and coldness of the surface, though it has not produced a fatal effect.

Antipyrine, in powder, dusted on to the cervix, or applied in solution, is equally effective, but the patient must not be left without a good plugging of gauze.

Calcium carbide is useful *in utero*, but gives rise to too much pain for use in the vagina. A small piece is introduced and left in the cavity of the cancerous uterus, and the vagina is then fully plugged with gauze, which is removed at the end of 24 or 48 hours. A warm injection must be given to wash away the fragments, &c., and a fresh piece introduced.

Injections should be made with boiled water, or with an antiseptic solution; if the latter, no toxic body should be used, and sublimate should, therefore, never be employed.

Deletiez, of Brussels, recommends injections of *essence of terebinth*. These act as a deodorant as well as a hæmostatic. The following plan should be followed:—Half an ounce of terebinth is placed in two pints of boiling water, a tablespoonful of calcined magnesia is added, and the mixture allowed to cool to 98° 6° F.

Coal-tar, used as "coal-tar saponiné,"¹ either as an injection, or to moisten gauze plugging, is an excellent deodorant.

Chloride of zinc in 1 per cent. solution for injections is the best disinfectant, and is recommended by Laroyenne, but it is sometimes irritating.

Chloride of lime has, according to Calmette and Chamberland, a disinfectant value equal to sublimate, and has the advantage of not being toxic. Paul Petit uses it for injection in the following way:—Three ounces of the powder are added to 2 pints of water, shaken up, and left for one hour. All but about 5 ounces of the liquor is then filtered through a double filter paper into a bottle and tightly corked. One tumblerful of this stock is mixed for use as an injection with nine tumblerfuls of boiled water, hot enough to make a solution at a temperature of 40° to 50° C. (104° to 112° F.). It is an excellent remedy, very cheap, and easy to prepare.

Hypochlorite of soda may be used—two tablespoonfuls in 2 pints of boiled water.

Permanganate of potash, to be effective as a deodorant, must be used at a strength of 1 in 500, and it is then very soiling.

¹ An emulsion of coal-tar, soap and alcohol.

Sprays of *oxygenated water* are used at Le Calvaire to obviate the smell of dressings from ulcerating cancers of the breast, and are very effective, but Récamier has not noticed, for vaginal use, any advantages over the disinfectants already mentioned.

Chloral in 1 per cent. solution disinfects and relieves pain.

In some cases of cancer of the cervix, where there is not very much discharge, it is possible, after douching each morning and drying the parts, to use powder (aristol, bismuth, or benzoin) and a loose plugging of dry gauze. *Ichthyol*, in 50 per cent. glycerine solution on tampons and *resorcis* (equal parts in water), can be used in the same way.

The dressings should never be left *in situ* longer than 24 hours, and it is an advantage to the patient, if the change is made at bedtime. When there is free discharge, all that can be done is injection thrice daily, and a pad of absorbent wool, at the vulva, kept in place by a T bandage.

THIOSINAMINE FOR OICATRICIAL STRICTURE OF ESOPHAGUS.

Dr. Carl Schneider reports (*Correspondenzbl. f. Schw. Aerzte*, No. 11/05), from the Children's Hospital at Basle, a case of stricture of the gullet, successfully treated by this drug, which was first introduced by Hebra in 1892. The stricture was the result of swallowing some concentrated caustic soda, and was treated at first by dilatation with sounds. The patient, a boy of 5 years old, was re-admitted six months later, the stricture having rapidly closed up to such a degree that even the finest sound could not be passed. Seven injections of a 5 per cent. glycerine solution of thiosinamine were given, the first three being 0.7 cm³. (= ℥ xij.), the remainder 1 cm³. (= ℥ xvij.). Treatment began on March 10. On April 8, No. 30 sound could be passed with ease into the stomach. The solution used for injection was—

R. Thiosinamini	-	-	-	-	-	gr. xv.
Glycerini	-	-	-	-	-	3 i.
Aq.	-	-	-	-	-	ad 3 vi.

TREATMENT OF MUMPS.

Dr. Carrière, in *Le Nord Médical*, advises disinfection of the nostrils, mouth, and pharynx. For the nose, he uses mentholised oil (1 per cent.) three times a day, or, preferably, applies a pellet of the following to each nostril three times a day:—

R. Menthol.	-	-	-	-	-	gr. iv.
Acid. Boric.	-	-	-	-	-	gr. xxx.
Vasellini	-	-	-	-	-	3 j.

For the mouth, gargles and washes should be used frequently throughout the day, and also with advantage at night. For these, 1 in 50 Liqueur de Labarraque (hypochlorite of soda) with half a teaspoonful of Eau de Botot¹; saturated solution of boric acid; 5 per cent. thymol solution, and 1 per thousand phenosalyl solution.

The pharynx should be mopped out with 1 in 50 hypochlorite of soda solution; large washings should not be used for fear of causing otitis.

The pain in the parotid gland can be relieved by applying one of the

¹ A mouth wash, containing aniseed, canella, peppermint, and proof spirit.

following two or three times in the 24 hours, and covering with flannel and oiled silk:—

R. Chloroformi	-	-	-	-	-	3 j.
Tinct. Opii	-	-	-	-	-	3 iss.
Ol. Camomil. Camphor.						
Ol. Hyoscyami.						
"Baume tranquille"	-	-	-	-	-	ss 3 v. M.

(Baume tranquille is a "mitrailleuse" preparation—belladonna, stramonium, tobacco, hyoscyamus, and many other things.)

To be applied hot.

A better preparation, and one more generally useful, is—

R. Guaiacol.	-	-	-	-	-	3 ss.
Methyl. Salicylat.	-	-	-	-	-	3 i.
Vaselin.	-	-	-	-	-	3 v. M.

For external use.

The bowels should be briskly moved at the outset of the attack.

R. Calomel.

Pulv. Scammon.

Sacchar. Lact. - - ss gr. $\frac{1}{4}$ for each year of age.

TREATMENT OF CHRONIC TONSILITIS.

Dr. Périer (*Annales de Méd. et de Chirurg. infantile*) recommends the following for use in the intervals between acute attacks:—

1. Mop out the throat every morning with glycerine of tannin (3 i. in $\frac{3}{4}$ i.).

2. Painting with nitrate of silver solution (gr. ij. in $\frac{3}{4}$ i.) must be substituted for this twice a week.

3. If the child is big enough, make it gargle every morning with some warm Eau de Labassère (contains sodic sulphide).

4. For a fortnight, give daily, in warm milk, half to three-quarters of a claret-glassful of the same water, and, for the next fortnight, an equal amount of Eau de Mont-Dore or de la Bourboule. The former contains carbonate and arseniate of soda, the latter bicarbonate of soda.

When the tonsils are hypertrophied, they should be touched every day with lemon-juice, perchloride of iron, tincture of iodine, or glycerine of iodine (gr. v. in $\frac{3}{4}$ i.). If reduction in size does not follow, galvano-puncture should be repeated every week until the glands are of a proper size, or are destroyed.

If suppuration seems imminent, the following gargle will soothe the pain:—

R. Acid. Carbolic.	-	-	-	-	-	℥ xv.
Inf. Coca fol.	-	-	-	-	-	3 iij.
Syrup. "Diacode" (Syrup of opium).						
Glycerini	-	-	-	-	-	ss $\frac{3}{4}$ i.
Aq. ad	-	-	-	-	-	o j. M.

If the child cannot gargle, the throat should be well mopped out with salicylic acid solution, and irrigated with warm solution of "guimauve borique" (marshmallow and boric acid).

As an antiseptic draught—

R. Betol.	-	-	-	-	-	gr. xl.—3 i.
"Julep. Gommeux"	-	-	-	-	-	$\frac{3}{4}$ vi. M.

Dose one dessertspoonful every two hours.

In order to relieve pain, rub in at the angles of the jaw, Ung. Hydrarg. & Belladonna, and apply wool and oiled silk.

When pus forms, open by a bistoury or by galvano-puncture, and gargle with—

R. Acid. Carbolic.

Acid. Salicylic. - - - - - 55 gr. xv.

Sp. Vini Rect. - - - - - q.s.

Inf. Eucalypti - - - - - ʒ ij. M.

(The alcohol is for dissolving the carbolic and salicylic acids.)

To be warmed in a bain-marie for use.

INJECTIONS OF SEA WATER FOR PHTHISIS.

Robert Simon and René Quinton treated 18 cases of tuberculosis in Paris during the winter by hypodermic injections of sea-water, made isotonic and sterilised. An injection of 50 to 300 cm³. was given every three or four days. The results were reported at the Académie de Médecine; 15 of the cases had a mean gain in weight of nearly 1 oz. per diem. The treatment lasted, on an average, for sixty days. The results compare most favourably with a series of cases treated at Arcachon.

TREATMENT OF LARYNGEAL PHTHISIS.

Dr. Hamm, of Brunswick, writes on this in the July number of the *Therapeutische Monatshefte*. The general treatment should be the same as that now adopted in tuberculosis of the lungs. The local treatment varies with the stage in which the disease is present in the larynx. In progressive and severe cases of lung trouble, all local applications as well as astringent inhalations should be stopped. Only narcotics should be used, and morphia should be replaced so far as possible by insufflation of orthoform, or other locally acting bodies. Inhalations are simplest and best, and Hamm prefers, above all others, balsam of Peru, using Moritz Schmidt's prescription—

R. Balsam. Peruvian. - - - - - ʒ i.

Sp. Vini. Rect. - - - - - ʒ ss. M.

Fifteen drops of this shaken up in a jar with boiling water, or camomile tea, and inhaled through a long paper tube, should be used three times a day.

Inhalations of weak carbolic solution are very useful, but are apt to upset the appetite.

When there is infiltration, or if ulcers are present, caustics are necessary. Lactic acid has a pre-eminence, but has no specifically favourable effect. Tri-chloroacetic acid and galvano-cautery are equally good. Lactic acid must be used in not too weak concentration, and must be rubbed in with a certain amount of force.

Curetting under cocaine by a sharp, or the double, curette seems to offer a chance of freeing the larynx from disease, but every nook and cranny cannot be reached in this way.

Hamm finds that his patients benefit considerably by the use of Lipp-springer mineral water. He prefers to send cases to winter in the North Sea Islands, rather than to Italy or Davos, since the temperature is more even, there being no sudden fall at sundown, and there is no dust.

DIGALEN.

Further experience of this amorphous digitoxin, to which is assigned the formula $C_{28}H_{44}O_{11}$, confirms its usefulness and trustworthiness. It was first obtained from digitalis leaves by Cloetta, after nearly five years' work. It is soluble in water, and is much more rapid in diffusibility than the crystalline digitoxins. Naunyn first reported on its use in the *Münchener medizinische Wochenschrift*, 1904, No. 31. Hoffmann has reported results obtained in Naunyn's clinic by intravenous and subcutaneous injection. Bibergeil in Senator's Clinic (*Berlin. klin. Woch.* 1904, No. 51), Klemperer (*Therapie der Gegenwart*, 1905, Heft 1), and Kollick (*Prag. med. Woch.* 1905, No. 18), as well as Naunyn, give it by the mouth, the doses used being:—for a single dose, .3 mg. = 1 cm³ of the solution, the maximum dose is 2 cm³. The maximum dose in 24 hours is 4 cm³. The drug has an unpleasant smell, but is easily given in milk or wine. A sweet wine is the best vehicle. It is well borne by the stomach, even in cases where digitalis cannot be given in increased doses, or possibly at all. The effects are much more quickly produced than those of digitalis, that is, increased blood pressure, diuresis, and lowering of the pulse rate. The dosage can be exactly regulated. Intravenous injection does not affect the walls of the vessels, nor the blood corpuscles; and it does not cause thrombosis. Winckelmann (*Therap. Monat.* July 1905), reports on its use in a case of heart failure in the course of a severe pneumonia affecting three lobes. The blood pressure rose from 75 to 110 mm. Hg. in less than 15 minutes, and the pulse rate came down from 140 to 120 in about half an hour. Digalen is superior to the infusion, or the powder of digitalis, by virtue of its known strength, and on account of the rapidity with which its effects are produced.

BALSAM OF PERU IN THE TREATMENT OF WOUNDS.

The application of this balsam to deep and extensive wounds, as well as to ulcers, is strongly recommended by several German writers. The wounds are thoroughly cleansed with sublimate lotion, and sterilised balsam is then poured in so as to fill them completely. (*Note.*—We would suggest as an improvement that the sublimate washing should be followed by one with hot sterile normal salt solution before the balsam is used.) A dressing of gauze, soaked in the balsam, is applied, and this should be changed every second or third day. Granulations spring up abundantly, and healing is very quickly completed.

SCOPOLAMINE.

Dr. M. A. Maass (*Therap. Monat.*, Aug. 1905) reviews the recent work in the production of narcosis by scopolamine, morphia, and chloroform. From the published reports he has collected a total of 1,499 administrations with 11 fatal results, showing a percentage of no less than 0.7. He points to Landau's estimation of the rate of mortality, 1 in 100 (*Deutsch. med. Woch.*, 1905, No. 28), as more eloquent than any words, and fully confirms Bakes' judgment that this mixed narcosis is uncertain and dangerous.

M. Monod, at a recent meeting of the Société de Chirurgie de Paris, announced that he intended to give the method no further trial, in spite of the warm commendation it had shortly before received from Walther and from Terrier.

STERILISATION OF THE SKIN.

Klemm has devoted much attention to this subject for some time, and has come to the conclusion that the danger of infection of a wound through the air is a negligible quantity, and also that practically the same is the case as regards the operator's hands, provided that these have been submitted to proper methods of sterilisation, although no means have been as yet devised by which the skin can be rendered completely sterile. The most efficient method of cleansing the hands is first to soften the skin in hot soap-suds. Soft soap is then rubbed thoroughly in and washed off under a hot water douche. The hands are then thoroughly brushed, and dried, on a rough sterile cloth. The fat is then removed by means of sulphuric ether, and a further brushing given with sublimate solution. The operation ends by rinsing in 70 per cent. solution of alcohol.

Dr. Willy Krause (*Therap. Monat.*, Aug.), strongly recommends Fürbringer's method by hot water and alcohol for use in the obstetric work of general practice. This procedure is very like that described above.

DISINFECTION OF CATHETERS BY FORMALIN.

Randle C. Rosenberger (*Therap. Gaz.*, Aug.) has carried out a series of experiments to test the efficacy of formaldehyde for this purpose. The catheters were enclosed in an ordinary diploma case with 5 cm.³ of formalin. This amount was enough to disinfect them and keep them sterile for 48 hours. As the gas does not injure the material, he concludes that previously sterilised catheters can be kept sterile indefinitely in a closed case containing a small amount of formalin.

TREATMENT OF SHINGLES.

For this troublesome complaint, Robinson (*N. Y. Med. Journ.*, June 1905) recommends rest, attention to general nutrition, and local asepsis. Internally, he gives antipyrine for the toxæmia and pain, using codeia and bromides if the pain is not subdued by antipyrine. If seen in an early stage, the eruption should be painted over with flexible collodion, and covered with a layer of gauze. At a later stage, an ointment of boric acid and subnitrate of bismuth is applied, to which, after a few days, some ichthyol is added. For the subsequent neuralgia, which is, as a rule, persistent and very rebellious to treatment, he has seen benefit from X-rays or the Faradic current and anodynes. Phosphide of zinc and arsenic may afford some help.

Reviews of Books.

Diseases of the Liver, Gall-Bladder, and Bile-Ducts. By H. D. ROLLESTON. M.A., M.D., F.R.C.P. London: W. B. Saunders & Co.

THIS volume is the result of twelve years' work and special study. The subject matter, arrangement and clearness of the enunciated views bear sufficient testimony to the care with which it has been prepared. Illustrations are plentiful and well executed, and some of the more important conditions are shown by coloured plates. Owing to lack of space, chapters dealing with the anatomy and physiology of the liver have not been included, the reader being referred to special books on the subject. Four-fifths of the book are devoted to the diseases of the liver; affections of the gall, bladder, and bile-ducts occupying the remaining fifth. The most important part of the book—over 100 pages—is that which deals with Hepatic cirrhosis and the various theories as to the cause and nature of the fibrosis.

Throughout the book the author has adopted the very commendable plan of devoting a paragraph to "conclusion" after each theoretical discussion. Nowhere can the value of such a scheme be more appreciated than in a chapter on such a subject as this, surrounded as it is by modern controversy. The author does not pin himself down to a definite opinion with regard to the priority of fibrous tissue or hepatic cell degeneration as the causative factor, but supports the view that both changes play a part. Under treatment, surgical measures receive their full share of consideration. The conclusion arrived at is, that operation, if undertaken at all, should be early, and even then is by no means satisfactory.

The author is to be congratulated on having produced a standard text-book on this intricate subject. Throughout there is evidence of great care, and the foreign literature has received its due share of attention. We can confidently recommend the work to our readers.

The Surgery of the Diseases of the Appendix Vermiformis and their Complications. By WILLIAM HENRY BATTLE, F.R.C.S., Surgeon to St. Thomas' Hospital, formerly Surgeon to the Royal Free Hospital, Hunterian Professor at the Royal College of Surgeons of England, &c.; and EDRED M. CORNER, M.B., B.C., F.R.C.S., Surgeon in Charge of Out-Patients to St. Thomas' Hospital and Assistant Surgeon to the Great Ormond Street Hospital for Sick Children, Erasmus Wilson Lecturer at the Royal College of Surgeons, &c. Pp. 208. London: Archibald Constable & Co. Price 7s. 6d. net.

THIS work deals with the subject from the point of view of the practical surgeon rather than that of the pathologist, although it contains an excellent section on this aspect of the disease. The authors are inclined to minimise the value of the examination of the blood, considering that "the clinical features form by far the most expressive and reliable indication for operative treatment." This is a point on which there is certainly room for a difference

of opinion. A single leucocyte count is probably of little value, but we have repeatedly seen a carefully conducted series of enumerations prove of the highest value in settling the question of suppuration in difficult cases, in some of which the symptoms were very equivocal.

It must be remembered that, in a leucocyte count, we have no infallible touchstone by which the presence of pus may be determined, but merely an extremely trustworthy aid to diagnosis.

While justly condemning indiscriminate operative interference, the authors strongly urge early operation, and in cases, in which suppuration has been found to have taken place, they are in accord with most surgeons, in recommending that the appendix should be removed, if it is easily found, but that a prolonged search is undesirable. In all cases, the appendix should be removed at a later date.

The incision, previously described by the authors, in which the abdomen is opened at right angles to the mid-point of the spino-umbilical line, is recommended as the incision of choice. This involves opening the sheath of the rectus, displacing the muscle inwards. Suitable as this incision is for many cases, it is doubtful if the majority of surgeons will be willing to use it in place of the incision recommended by McBurney.

The method of amputation of the appendix is by means of a clamp, which is placed on the root of the organ, crushing the tissues in a manner similar to that in which the inner coats of an artery are crushed by a ligature. The appendix is then cut off, and the compressed stump buried by a row of sutures.

The complications of appendicitis and the rarer forms, such as actinomycosis and tubercle, are discussed, and there is a useful chapter on appendicitis from the point of view of life insurance.

The book affords an excellent summary of our present knowledge of this condition, and its essentially practical nature makes it one of the most valuable contributions to the literature of the subject which has been published.

Recurrent Effusion into the Knee-Joint after Injury, with especial Reference to Internal Derangement, commonly called Slipped Cartilage. By Sir WILLIAM BENNETT, K.C.V.O., F.R.C.S., Senior Surgeon to St. George's Hospital, Surgeon to King Edward VII. Hospital. Pp. 29. London: Longmans, Green, & Co.

THIS booklet is a clinical lecture, delivered at St. George's Hospital, which has already appeared in the columns of the *Lancet*. It contains an analysis of 750 cases of effusion into the knee-joint, which are arranged under two headings, viz. :—Those entirely independent of any constitutional conditions, and those influenced by constitutional conditions. There are eleven illustrations, nine of which are those showing injuries to the semilunar cartilages. We can recommend the pamphlet to those interested in general surgery.

Abdominal Pain. Its Causes and Clinical Significance. By A. ERNEST MAYLAND, M.B., B.S. (LOND.). Surgeon to the Victoria Infirmary, Glasgow, &c. London: J. & A. Churchill.

THIS book is divided into two portions—the first is devoted to a discussion of the causes and localisation of pain in abdominal conditions, and the referred pains of diseases of the chest, spinal cord, &c. The second part is

devoted to treatment, an account being given of the methods adopted by the author. The book is written in the hope of its being useful to the general practitioner. We think that this is likely to be the case, as regards the first part. The second part is of more interest to the surgeon, as it contains an account of the methods adopted by the author himself.

Diseases of the Ear for Practitioners and Students of Medicine. By JOHN KERR LOVE, M.D., Aural Surgeon, Glasgow Royal Infirmary; Lecturer in Aural Surgery, St. Mungo's College, Glasgow; Aurist to Glasgow Institution for the Education of the Deaf and Dumb. Pp. 339. 4to. With 54 stereoscopic photographs and two coloured plates. Bristol: John Wright & Co. London: Simpkin, Marshall, Hamilton, Kent & Co., Ltd.

THIS is one of the most sumptuous volumes which we have seen in an age when medical text-books are not only examples of the best literary and scientific work, but also masterpieces of the engraver's and printer's art.

Dissection of the elaborate structures contained within the temporal bone is extremely difficult, and most students are only familiar with them through the medium of museum specimens. Dr. Love, however, provides a series of stereoscopic photographs of sections and dissections of the temporal bone, which should make this difficult piece of anatomy clear to any one who will take the trouble to follow the text with the aid of the photographs and the excellent stereoscope which accompanies the book.

There is an excellent chapter on the diagnosis of internal ear deafness, and the question of the education of the deaf and dumb is fully treated. The various measures employed in different countries for training children, afflicted in this direction, are described and discussed.

The author considers that, so far as possible, the oral system should be employed, but that, in later life, a sign language becomes almost a necessity, not as a substitute for, but as an addition to lip-reading.

Orthodontia and Orthopædia of the Face. By V. H. JACKSON, M.D., D.D.S. London and Philadelphia. : J. B. Lippincott & Co.

THIS work, although touching on all branches of orthodontia, deals chiefly with special apparatus for correcting irregularities of the human teeth. Dr. Jackson favours a removable wire plate as a base of attachment for springs used for forcing teeth into their normal position. Hundreds of these plates, ingeniously devised by the author, are depicted, and their mode of manufacture most fully described. We should have liked to have seen more space devoted to local prophylaxis, for by the judicious extraction of erupted or unerupted teeth, many complicated irregularities can be assured. The printing and illustrations are first class, and the work, as a whole, reflects great credit on the author.

Naked-Eye Anatomy of the Human Teeth. By T. E. CONSTANT, L.R.C.P., M.R.C.S., L.D.S. Bristol: John Wright & Co. Price 7s. 6d. net.

WE may as well say at once that the major part of the book seems to us unnecessary. Scattered through it are some interesting suggestions, and the author has taken pains to make his meaning clear; but the descriptive anatomy of the face is so well written in the standard text-books of anatomy,

that it seems to us that it was hardly necessary to reproduce it, while the part devoted to the actual naked-eye anatomy of the teeth could well have been enlarged.

The author suggests the use of the inter-dental papillar to describe the portion of gum between the teeth, and thinks that the dental periosteum serves to take off the shock of mastication chiefly by means of its vascularity.

There are other interesting points, but they could have been brought together in less compass than in the present book.

A Laboratory Manual of Physiological and Pathological Chemistry, for Students of Medicine. By Dr. E. SALKOWSKI. Translated by W. R. Ormendorff. London: Chapman & Hall.

THIS is a translation of the Second German Edition of Professor Salkowski's admirable manual. For laboratory work, we know of no book which embodies sounder chemical methods in the examination of the various tissues and secretions of the body. The quantitative analyses, especially, are fully and clearly described. It must be remembered, however, that the work is not intended to be used as a book of reference for the student, or practitioner, who is searching for the explanation of some fact in clinical medicine. We can heartily recommend the book for use in the Physiological laboratory, particularly by advanced students.

Divine Hygiene. Sanitary Science and Sanitarians of the Sacred Scriptures and Mosaic Code. By ALEXANDER RATTRAY, M.D. (Edin.). Two Volumes. Pp. 1403. London: Nisbet & Co. Price 32s.

THE writer of this book is evidently a very industrious, careful, and reverent Biblical Student. He knows his Bible thoroughly, and endeavours to show how the teachings of the Mosaic Law—and, indeed, of the Scriptures generally—are in accord with those of the laws of modern sanitation. There is much information that is useful, but it might have been conveyed in a book one-fourth the size of the two volumes before us, and it might then have been more readily grasped. As it is, one is wearied by its prolixity and repetition. The style is not clear, for the sentences, in many cases, are involved, and the punctuation is decidedly bad. Errors of spelling and grammar are frequently met with.

A German-English Dictionary of Terms used in Medicine and the Allied Sciences. By the late HUGO LANG, B.A. Edited and completed by BERTRAM ABRAHAMS, M.B., B.Sc., F.R.C.P., Assistant Physician, Westminster Hospital. London: J. & A. Churchill. Price 15s. net.

THIS dictionary is a Glossary of the German medical words in everyday use, and includes all the more important chemical, biological, and pathological terms. The work has been compiled with great care, and the same may be said with regard to its production, for the printing is very clear, and the type is of a very readable size. It is a work which will be found extremely useful by those reading scientific German.

A Handbook of Surgery for Students and Practitioners. By FREDERIC RICHARDSON GRIFFITH, M.D., Surgeon, Bellevue Dispensary, &c. With 417 illustrations. London: W. B. Saunders & Co.

IN the preface it is stated that "this book is intended to serve as a working guide for the Student and General Practitioner. The author has attempted to present a brief outline of the principles and practice of Surgery, giving the essentials of the subject in as concise a manner as is consistent with clearness." Certainly a brief outline is given, but we cannot agree with the latter part of this statement. The method adopted consists of enumerating a number of signs and symptoms of diseases or injuries in a disjointed, rough, note-book sort of style. A long list of drugs, prescriptions or operations is added without any clear indications when they should be used, or in what combinations, or which may be the most useful. It is therefore not easy to see how this book is a working guide to the student or practitioner.

The Internal Secretions and the Principles of Medicine. By C. E. DE M. SAJOUS, M.D. Vol. I. Philadelphia: F. A. Davis Company.

THIS volume of eight hundred pages is the first fruit of the author's efforts to "collate the necessary elements for a more solid foundation than medicine now possesses." It may be readily granted that the present foundations of medicine are unsatisfactory, but when we read that "the anterior pituitary body is the most important organ of the body as governing center of the adrenals and therefore of all oxidation processes; that the flushed face of the drunkard betokens adrenal over-activity, while the pallor of the advanced stage typifies the contrary condition; that chloroform furnishes a typical picture of suprarenal activity followed by insufficiency; that the posterior pituitary body is the center upon which all emotions, shock—physical or traumatic—and kindred sources of nervous functional excitement or depression react, and impairment of its functions accounts for the pathological phenomena now ascribed to such cases"; when we read these, and many similar statements, we cannot accept the guiding hand of the author.

Atlas and Epitome of General Pathologic Histology. By DOCENT DR. HERMANN DÜRCCK of the Pathologic Institute, Munich. Authorised translation from the German. Edited by Ludwig Hektoen, M.D., Professor of Pathology and Rush Medical College, Chicago. Pp. 371. Coloured illustrations, 176, on 80 Lithographic plates and 36 figures in black and colours. London: W. B. Saunders & Co.

THIS excellent little book gives a very clear account of the more generally accepted views upon the significance of various pathological processes, and does not attempt to go into the detail of conflicting theories. It is essentially a work for those commencing the study of pathology, and by these it will be found most useful. The chief feature of the book is the number of excellent lithographic plates. These have been reproduced with the utmost care, and are worthy of the highest praise. The figures too are exceedingly good. In fact, the plates and figures are some of the best we have seen. Dr. Hektoen is to be congratulated upon having translated the book, thus enabling the English student to have the advantage of such a trustworthy work.

The Treatment of Diseases of the Eye. By DR. VICTOR HANKE, translated by J. Herbert Parsons, B.S., D.Sc., F.R.C.S., Assistant Ophthalmic Surgeon, University College Hospital; Assistant-Surgeon, Royal London Ophthalmic Hospital, and George Coats, M.D., F.R.C.S., Chief Clinical Assistant, Royal London Ophthalmic Hospital. Pp. 222. London: Hodder and Stoughton. 3s. 6d. net.

THE translators are to be congratulated upon the production of this little book, which is practically a *résumé* of the methods adopted in the clinic of Professor Fuchs of Vienna. The book deals practically with therapeutic methods only, though operations are mentioned but not described. We can heartily recommend it to those, who have a knowledge of ophthalmic surgery, as a very useful one for reference in the treatment of disease, but it is hardly one to be recommended to the general practitioner.

Medical Philology—Gathered by L. M. GRIFFITHS, M.R.C.S. (Eng.). Part I. A.—El. Pp. 100. Bristol: J. W. Arrowsmith.

THESE notes on old-world expressions and words were made when the author was assistant editor of the *Bristol Medico-Chirurgical Journal* under Greig Smith. They deal with "the social, literary, and anecdotal aspects of our profession." In the little volume now published, the second of these aspects is most in evidence. We cordially re-echo the author's hope that he will find opportunity to continue the series through the rest of the alphabet. This first volume is certainly interesting. The complete series will be valuable for that history of medicine which is still in the lap of the Gods.

Colls's Fracture and other Fractures and Disjunctions at the lower end of the Radius and Ulna. By ANDREW FULLERTON, B.Ch., F.R.C.S. (Irel.); Hon. Assistant Surgeon to the Royal Victoria Hospital and to the Belfast Hospital for Sick Children, &c. 23 illustrations. Belfast: Alex. Mayne and Boyd. 1s.

THIS little book is an analysis of 70 cases of those injuries which the author has treated. The illustrations are for the most part reproductions of skiagrams of his cases. Without containing anything that is new, the book contains a clear and concise description of these injuries.

Strength and Diet: A Practical Treatise with special regard to the Life of Nations. By the HON. R. RUSSELL. 649 pp. London: Longmans, Green & Co. 12s. 6d. net.

THE title of this admirable book is peculiarly enough an indication of its contents, and the author must be congratulated on the systematic manner in which he has gone to work, and the wealth of material which he has collected. The compilation of opinions and theories is a very valuable one, and is cleverly put together. Vegetarians will find in the work arguments innumerable in support of their pet ideas of existence, and certainly the Hon. R. Russell makes out a very strong *prima facie* case. We heartily commend the book to our readers as forming the subject for interesting study and thought.

Novelties and Notices.

DR. THEINHARDT'S FOODS.

(Theinhardt Co., Ltd., 33, Seething Lane, E.C.)

In our notice of these preparations in the September issue, we gave the address as Messrs. Hartmann, Hohmann & Co. We are informed, however, that a direct branch has been opened in London with an address as above. We are further informed that Dr. Theinhardt's Soluble Infants' Food and Hygama will be advertised *exclusively* to the medical profession, and this is in itself a good reason for their recommendation and support by medical men. Our readers will doubtless give them a fair trial.

THE CYLLIN PASTILLE.

(Jeyes' Sanitary Compounds Co., Ltd., 64, Cannon St., E.C.)

Messrs. Jeyes have just put upon the market a new "Cyllin" preparation. The pastilles contain one-tenth of a minim each of pure Cyllin, and produce a really efficient bactericidal solution when dissolved in the mouth. They are conveniently put up in metal boxes, each containing 2 ounces, at the price of 1s. per box.

CLINICAL BLOOD-TUBE.

(The Laboratory, Pietermaritzburg.)

This is a small metal tube devised for the preservation, or transmission, of a sample of blood, pending microscopical examination or numerical estimation, and contains a tube in which is a measured quantity of the diluting fluid (Sod. Sulph., Sod. Chlor., and Hydr. Perchlor), which also prevents the coagulation of the blood added to it, and also a small capillary tube made to contain a column of blood $\frac{1}{100}$ the bulk of the diluting fluid. The chief advantages of this little instrument are its ready transmissibility, and the simplicity of its technique. Full instructions for its use accompany each tube.



COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the October Competitions will be announced in the December number.

a.—The Subject of the Essay for November will be

The Treatment of Acute Intussusception.

b.—Answers to the following questions are invited :—

1. What are the diagnostic symptoms and signs of hæmorrhage into the Pons Varolii?
2. Under what conditions does "crossed-leg" deformity occur?
3. A boy, age 18 years, was admitted to hospital complaining of swelling of the abdomen. He was small for his age, and somewhat anæmic; the teeth were decayed, and the tongue was cracked. He had no occupation, and had always been temperate. Previously, he had often suffered from diarrhoea and epistaxis. He said that his abdomen commenced to swell about a month previously. It was found to be distended, and there was a marked enlargement of the superficial veins. The liver and spleen could not be felt. The heart and lung sounds were normal, as was also the urine. Under an anæsthetic, the abdomen was opened and much serous fluid escaped. Masses of enlarged glands were felt, and there were some peritoneal adhesions. The peritoneum was otherwise smooth. Three days after the operation there was some vomiting; two days later diarrhoea and epistaxis occurred. One month later his abdomen again began to swell, and this was accompanied by œdema, commencing to spread upwards from both ankles. The superficial veins of the chest became distended. The liver could not be felt, but the spleen was decidedly enlarged. Diarrhoea was frequent. The abdomen was tapped five times in four months, each time serum, in quantities varying from ten to thirteen pints, was removed. The heart gradually became weaker, rhonchi were heard over both lungs, the temperature became subnormal, and the patient died, after being in the hospital for just five months. What conditions were found post-mortem which would account for the above symptoms?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of December, 1905. No Essay must contain more than three thousand words, and the Editor reserves the right to publish any Essay which may have been sent in, the author choosing whether his name be published or not.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of December, 1905.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.

(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

THE PRACTITIONER.

DECEMBER, 1905.

THE THYMUS GLAND.

By T. GILLMAN MOORHEAD, M.D., M.R.C.P.L.,

Physician, Royal City of Dublin Hospital.

OF the various so-called ductless glands, none has, perhaps, been so much neglected, and at the same time so much the subject of vague conjecture, as the thymus gland. Of late years, however, much real interest has been awakened in it, owing to its supposed relation to various blood diseases, and it has shared in the numerous investigations, which have been carried on, on all the hæmopoietic tissues. In consequence, it is of interest, at present, to take stock of the work, that has been done upon it, and to ascertain of what real information concerning its functions we are possessed.

Of the mode of development of the gland but little need be said, as, since the researches of Kölliker 50 years ago, it has been universally accepted, that it arises in a manner similar to that of the various glands, connected with the alimentary canal. He demonstrated that it takes origin, as a bilateral hypoblastic diverticulum, from the third and in some animals, also from the second and fourth visceral arches. The original diverticula, at first hollow, soon lose their connection with the pharynx, and, becoming free in the neck, bud off numerous solid epithelial outgrowths, this stage being known by Waldeyer as the epithelial period of the gland. From the very earliest periods of growth, lymph-cells appear amidst the epithelial cells, having probably migrated from the surrounding mesoblast, and aided by the ingrowth of connective tissue, ultimately divide the organ into the numerous lobules of which it is composed at birth. Before birth, the two lateral outgrowths come together and form a median structure, situated in most animals at the upper portion of the thorax, and in the neck, and bearing a fancied resemblance to a thyme leaf. In some animals, however, the gland remains as a bilateral organ, and is situated high up in the neck.

In microscopical appearance, at birth, the gland is composed of numbers of lobules, separated from one another by intervening septa of fibrous tissue, and is enclosed in a capsule. Each lobule is composed of a cortical region, packed with lymphoid cells, and of an inner medullary portion, in which the same or very similar cells are found, but fewer in number and rather larger. In both medulla and cortex, there is a connective tissue stroma, but that in the medulla is much coarser, and much easier to see, while, placed in the centre of the medulla, lie one or more Hassal's corpuscles, the supposed remnant of the original epithelial outgrowths. These corpuscles recall, to some extent, the appearance of the cell-nests of epitheliomata, but differ from them in being composed of very much fewer cells. The central cells, moreover, seldom undergo as much flattening out as is seen in cell-nests, and the peripheral cells frequently unite with one another to form a sort of capsule. Peculiar granulations, with an oxyphile reaction, often occur in these corpuscles, and I have occasionally observed an invasion of the entire corpuscle with eosinophile and neutrophile leucocytes. Some observers deny the epithelial origin of these corpuscles, and regard them as derived from blood vessels by proliferation of the endothelial lining, but the weight of evidence is against this view.

In addition to the above briefly-described structures in the gland, it has now been well established that eosinophile leucocytes are fairly abundant along the line of the fibrous septa, and they are also met with in the outer zone of the cortical portion of the lobules. Nucleated red blood corpuscles are also stated to be present, but I have never myself found them except within the blood vessels.

Concerning the weight of the gland at birth, very different opinions are expressed by different writers. Dudgeon, in a recent and valuable paper, has collected the records of fourteen observers, and points out that, while one of these places the average weight at 5 grammes, another puts it at 30 grammes. Between these extremes, the most diverse weights are recorded. Dudgeon's own opinion is that the average weight is from 7 to 10 grammes. From these statements, it can be readily understood that practically no information of any value can be obtained, from noting the weight of the gland, except in

extreme cases. This point will be further referred to subsequently, but it may be here said, that a similar variation in size is found in animals. It is no uncommon occurrence to find the gland large and conspicuous in one animal, while in another, from the same litter, it can hardly be found. Actual absence is, however, rare, and, so far as man is concerned, is almost unknown. Even in monsters, with the exception of acephalic twin foetuses, as Ballantine points out, it is constantly present, and is often of large size. One case of absence in a child of 8 months is related by Clarke, in which death resulted from general anasarca and kidney disease. During life, some subcutaneous ecchymoses occurred which, he points out, is in favour of the suggestion that disease of the thymus and hæmophilia are related to one another.

Although there are such varied opinions as to the normal weight of the thymus gland at birth, it is pretty generally agreed that the gland continues to grow in man, both absolutely, and also relatively to the body weight, up to the age of two years. At that date, its rate of growth begins to diminish, but it retains its relative weight to the body up to the period of puberty, and then begins to undergo a gradual degeneration. It seldom disappears completely, for even, at an advanced age, traces of lymphoid tissue, and a few Hassal's corpuscles can be found in the mass of fatty and connective tissue, which occupies its position in the superior mediastinum. Occasionally, it remains persistent throughout the whole of life, and in particular is found enlarged in certain diseases, such as exophthalmic goitre and myasthenia gravis, while there is much evidence to show that early atrophy and degeneration are found in marasmic conditions. It is interesting to note that the avian thymus does not undergo retrogressive changes.

According to many writers, degeneration of the intimate structure of the gland, without loss of weight, does occur before puberty, but nothing absolutely definite is yet known, except that there is, as a rule, a gradual increase of the interstitial connective tissue. After puberty, the gland becomes infiltrated with fat, and the third or fatty stage of Waldeyer is gradually reached. The mode of fat deposit, according to some, is one in which the fat is laid down in the lymphoid cells themselves, while others believe that the gland is first invaded by epithelioid cells which, sprung from the endothelium of degenerating

blood vessels and lymphatics, gradually replace the lymphoid elements, and, almost as soon as they themselves appear, become converted into fat cells. The corpuscles of Hassal are gradually converted into homogeneous hyaline structures, and may be infiltrated with fat or lime.

Functions of the Thymus.—The early views regarding the functions of the thymus were, like those concerning many other organs, of a mechanical nature. The gland was supposed, in fact, to act mainly as a prop and support, for the large vessels in relation to it, and also to prevent compression of these vessels by the clavicles. The frequent appearance of a milky fluid within it, some hours after death, led also the view that it helped to purify the chyle, before the discharge of that fluid into the subclavian vein; while some anatomists believed that its function was to receive the succus nutritius of the nerves, and, after purifying the same, to return it again for the general use of the body. Lastly, we are indebted to Simon for the view that it fulfilled its use as “a sinking fund of nourishment in the service of respiration.” These vague ideas passed away with the dawn of experimental and of chemical physiology, and, although partly from anatomical reasons the gland was long neglected, many experiments have been carried out upon it of late years, which may now be considered.

Blood Pressure Experiments.—The brilliant results, obtained from experiments with extracts of the supra-renal and thyroid glands, naturally lead to similar investigation as to the effects exerted by thymus extracts upon blood pressure. Before referring to these, however, it is important to bear in mind that Sheen and Vincent have shown, that both a pressor and a depressor substance can be extracted by saline solutions from almost all glandular structures, and that accordingly only very pronounced effects, produced by any extract, can be regarded as in any way specific. Judged from this point of view, the thymus must be regarded as a purely negative organ.

Svehla indeed states that watery extracts of the Thymus of men, dogs and other animals, when injected intravenously, cause a great fall of the blood pressure and cardiac acceleration, when the vagi are intact, and remarks that the effect is more pronounced, when the injections are made upon young animals. He seems, however, to have overstated the result, for Swale

Vincent has shown that a depressor substance indeed can be extracted by saline solution and by alcohol, but that the substance, so extracted, only produces effects similar to those exerted by extracts of almost all other tissues. My own experience confirms Vincent's results. Working on rabbits with the Thymi of human foetuses and with lamb's Thymi, I have found, (1) That an alcoholic extract of the human glands causes an immediate slight depressor effect on blood pressure, and, at the same time, causes irregularity of respiration, irregularity of the heart, and increased force of the individual heart beats. This result is of some interest, as it directly negatives Svehla's contention that the depressor substances do not appear in the human gland during intra-uterine life. (2) An alcoholic extract of lamb's Thymus causes a primary slight rise, followed by a more prolonged and pronounced fall in the blood pressure. This result also is of some interest, inasmuch as it shows the existence of a pressor substance in the Thymus, a fact which has hitherto been denied. (3) A saline extract of human glands, after precipitation by alcohol, has a slight depressor effect, and causes also temporary cessation of respiration, together with increased force, and irregularity of cardiac action. (4) A similar extract from lamb's Thymi causes only a temporary cessation of respiration, and has no effect on blood pressure. The above results, as already stated, must be regarded as purely negative, and at any rate seem to conclusively prove, that the function of the gland is not directly to produce any influence on the vasomotor system.

In addition to the effects in blood pressure caused by the intravenous injections, certain other effects have been noticed, when injections have been given, either intravenously, or subcutaneously. Abelous and Billard stated that hypodermic injection of unboiled extracts produced symptoms, resembling those of strychnine poisoning in frogs, and Svehla, experimenting also with watery extracts on non-anæsthetised dogs, found that intravenous injections caused restlessness, dyspnœa, and giddiness, in fact, according to Svehla, all the symptoms commonly observed in the so-called "Thymustöid." These observations are not yet fully confirmed, and are indeed denied by Vincent, who found only slight stimulant effects, such as may be produced by any proteid extracts, to result from subcutaneous

injections in frogs, rats and mice. He, however, employed a boiled saline solution. Working myself with a different object on geese, guinea-pigs, and rabbits, I have been struck by the apparent stimulating effect produced by subcutaneous and intraperitoneal injections of both the whole emulsified Thymus, and also of various unboiled extracts, but I have never noticed anything approaching the symptoms referred to above. Ghika believes that the difference in results, arrived at by different observers, depends largely on the difference in age of the animals experimented upon, and contends that the gland secretes a substance which, besides being excito-motor and excito-cardiac, exercises a distinctly favourable influence upon the general growth and nutrition of young animals. The view coincides with the pathological findings in marasmic conditions already referred to, and also with some of the results obtained after extirpation of the Thymus. Quite lately also, writers on the subject of myasthenia gravis have been disposed to attribute the symptoms of that disease to a failure of Thymus secretion, while, therapeutically, extracts of the gland have been stated to exert a beneficial influence on rickety and debilitated children. Sinnhuhr has determined that Thymus feeding has no influence on lime metabolism.

Before concluding this section, the exophthalmus, caused by the intravenous injections of Thymic extracts, may be referred to. This has lately been shown to be produced by retro-orbital hæmorrhages, and is probably in no way specific, being caused by the nucleo-proteids present.

Extirpation of the Thymus.—Owing to its anatomical situation, this operation is attended with considerable difficulty in some animals, but, nevertheless, it has been performed by numerous experimenters, and some interesting results have been obtained. Abelous and Billard found that extirpation was always followed in frogs by muscular weakness, and progressive debility, ultimately terminating in death, but their results are invalidated by their failure to take due precautions against sepsis. The same observers found that an alteration in the pigmentation of the skin always appeared immediately after the operation, and persisted for a couple of days. Tarulli and Lo Monaco found that in dogs the organ was not indispensable, and that its removal was only attended

with ill effects in young animals. In these, there was a temporary diminution in number of red blood corpuscles and muscular weakness, but both symptoms disappeared as the animals grew older. Friedleben arrived at very similar conclusions, but found in addition that extirpation of both spleen and thymus was always followed by rapid blood deterioration and death. Cantoni concluded that the organ had no influence upon growth, or upon hæmopoiesis, and Swale Vincent, operating upon guinea pigs, was led to the same result. The two most interesting series of experiments, however, are those by Goodall and Paton, and by Ghika. The former removed the gland from 14 young guinea pigs, and made a careful examination of the blood, over an extended period following the operation. They found that no change in the number of red blood corpuscles occurred, but noticed a considerable leucopenia, which affected equally all varieties of leucocytes, and persisted for about two months. During this period, leucocytosis and lymphocytosis, apparently normal in amount, could be excited by injections of terebene, and of tubercle bacilli respectively, but the animals appeared to be more than usually susceptible to septic injections. Ghika, working with cats and rabbits, also found that no change in red blood corpuscles occurred, but observed almost invariably a temporary diminution in weight and arrest in development, which passed off as the animals grew older. On the other hand, he was unable to detect any diminution of leucocytes, and often found hyper-leucocytosis. This he attributed to a vicarious over-action of the red marrow, which he found very vascular and proliferated in all animals, which he examined post-mortem.

A study of the actual papers, referred to above, leads to the conclusion that the gland must exert some influence upon nutrition, and also upon hæmopoiesis, and pathology supports this view—thus, in acromegaly, a persistent and enlarged thymus is the rule, and, apart from blood diseases, it is found that the thymus enlarges, and shows evidence of active cell proliferation and division in most acute conditions attending leucocytosis. Its blood forming function is probably entirely confined to the white cells, and though its histological structure would lead one to suppose that its principal product was lymphocytes, we have seen that oxyphile cells are also present, and are probably

produced within it. The method of origin of the lymphocytes, and other white cells within the gland, has been for long a subject of controversy, some maintaining that the cells arise from a transformation of the epithelial elements, and others that they originate in the surrounding connective tissues. Beard, after an exhaustive investigation on the Skate, concluded that the first leucocytes in the body to appear were those in the thymus gland, and maintains their epithelial origin. He looks upon the gland, as the precursor of all the lymphoid tissues of the body, the latter arising metastatically from the former in the manner of malignant growths. This view has been somewhat shaken by the report of Bryce, that he has undoubtedly observed leucocytes in the blood of lepidosiren, before any vestige of the thymus could be detected, but, if confirmed by investigation of further animals, it would certainly help to explain many other facts. That the gland is only hæmopoietic, however, seems doubtful, owing to the fact that its chemical constitution differs from that of the lymphoid tissues, in containing traces of thyroïdine and other substances.

In the course of extirpation and other experiments, and from pathological conditions, it has been supposed that the thymus might act vicariously, or along with other organs. Such a co-relation of function has been suggested for the thyroid gland, the spleen, the pituitary body, the marrow, and the sexual glands, but the evidence in favour of all these theories, with the exception of the last, is quite inconclusive. Blondel appears to have been the first to definitely suggest that the thymus and ovary were similar in chemical constitution, although note had long previously been made, by many, of the fact that, in most animals, the thymus maintains its size up to sexual maturity, and then begins to atrophy. Calzolari found experimentally that hypertrophy of the thymus followed castration in rabbits, and lastly, Henderson appears to have established upon a sound basis a sort of antagonism between the thymus and the testes. He concludes that castration in cattle causes a persistent growth, and retarded atrophy of the thymus, and has observed similar effects in rabbits and guinea-pigs. He also states that, in bulls and unspayed heifers, the normal atrophy of the thymus, which begins about the period of puberty is greatly accelerated, when the bulls have been used

for breeding, and when the heifers have been pregnant. The exact significance of these facts cannot yet be determined, but their importance as showing the mutual interaction of organs is great.

Thymotoxic Sera.—Up to the present, I believe, no investigations upon thymotoxic sera have been published with the exception of a brief note of my own in the supplement to the *B.M.J.* for July 1, 1905. The matter is one for surprise, as, after the brilliant results obtained by Flexner with lymphotoxic, splenotoxic, and myelotoxic sera, it seemed probable that important results might be obtained in this way. My own experiments which, however, have not yet been completed, are, so far, entirely negative, although attempts have been made to immunise rabbits against guinea-pigs, guinea-pigs against rabbits, and geese against guinea-pigs. The method consists of injecting, twice or three times a week, the emulsified thymus gland of one animal into the peritoneal cavity of another, the most careful sterile precautions being employed. After the series of injections is completed, the serum of the "immune" animal is obtained, and is used for injection into the type of animal from which the glands were obtained. Thus the serum of rabbits, immunised against guinea-pigs, is injected into guinea-pigs, and similarly with the others. The serum, which I have obtained in this way, even after prolonged periods of immunisation, was not found in any case to (1) agglutinate emulsified thymus glands in vitro, (2) to have any leucocytic action on the white cells of the blood examined in a warm stage, or (3) to have any constant effect on the animals into which it was injected. Although it is now recognised that cytotoxic sera are more difficult to produce, and are less specific than was at first believed, these results when put beside those of Flexner, must, I believe, be interpreted as showing that the importance of the hæmopoietic, and other functions of the thymus in extra-uterine life, is not very great.

Pathology of the Thymus.—The pathological changes, to which the thymus is subject, are too numerous to admit of even an enumeration here, so that we must content ourselves with referring only to two facts: first, that unusual atrophy is so constantly found in association with marasmic conditions of children as to be regarded as, in some way, related to that

state. Whether the relation is one of cause and effect, or whether both are the result of the general inanition, is, of course, as yet undetermined. A similar atrophy is found towards the end of the period of repose in hibernating animals, and is here, apparently, a part of the general wasting of the body which occurs. Second, that great hypertrophy of the gland is found in many morbid states, such as Hodgkin's disease, leukæmia, Graves's disease, acromegaly, lymphatism, so-called thymic asthma, and myasthenia gravis. In none of these, can the enlargement be regarded as essential, inasmuch as it is not always present. The enlargement in the blood diseases appears to be merely a part of the general involvement of the hæmopoietic, or potentially-hæmopoietic tissues, while the hypertrophy in Graves's disease, and in acromegaly, has given rise to the theories of vicarious action, already alluded to, and has even led to the employment of thymic feeding as a therapeutic means in these diseases. The relation of the gland to lymphatism and thymic asthma has been much debated, but very little new light has been thrown on these conditions of late years. Myasthenia gravis is the last disease to be added to those, which may throw light on the functions of the gland, and, in connection with it, the supposed excitomotor functions of the thymic secretion are of great interest.

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SOME TUMOURS OF THE BREAST.

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DURING two years as Surgical Registrar a series of tumours of the breast came under my observation, and I am recording brief notes on some of them, as they possess points of interest in diagnosis, and unusual features in their termination.

The close relation between the neoplasms and the inflammatory conditions of the breast is well emphasised in these reported cases, while the further contingency, a malignant change supervening on a previous simple state, is exemplified in some of them.

Case 1. Age 53.—The patient presented herself with an oval tumour of the left breast, which had been noticed for seven years; during that time it had slowly increased in size. There was no history of injury.

On examination a lens-shaped swelling, hard and lobulated, was discovered just below the left nipple; it was elastic, but not fluctuant, movable on the pectoralis major, and not attached to the skin; manipulation of the tumour caused pain. The axillary glands were not enlarged.

At the operation a growth of the shape and size of a tangerine orange, cut across, was removed. Its superficial surface was convex, its deep surface flattened, and it presented a lens-shaped appearance. On section it seemed to be an adenoma with cyst formation.

This opinion the microscope confirmed.

Case 2. Age 39.—A spare woman with lens-shaped masses in both breasts, somewhat fixed to the skin but not to the deeper structures. No enlarged glands in the axilla. The swellings were tender, they were elastic and somewhat irregular in outline. The duration of the disease was uncertain.

At the operation a disc-shaped mass of tissue, together with the nipple, was removed. On cutting this across it was found to consist of a number of cysts filled with a colloid secretion, in some of the cysts the contents were thick and inspissated.

The microscope showed a condition of diffuse mastitis with cyst formation; the cysts were all small.

Case 3. Age 46.—This patient presented herself with a round, tense, fluctuant swelling in the upper quadrant of the right breast. The tumour was the size of a walnut. No glands were palpable in the axilla. There was a slight yellow discharge from the nipple.

The previous history was that six weeks ago she noticed a running from the right nipple, and some three weeks afterwards on examining the breast she found a tumour.

At the operation a hard scirrhus mass, which was growing from the wall of a cyst, was discovered, and the breast was accordingly removed.

The microscope confirmed the diagnosis of scirrhus.

Case 4. Age 40.—This patient was admitted with a circumscribed lump in the right breast of ten months' duration. It was distinctly fluctuant, freely movable, and painless. There were no enlarged glands in the axilla. As the patient was suckling with the left breast, and as there was a small amount of sugar in the urine, operation was delayed.

When, after some weeks, the breast was explored, it was found to be in a state of interstitial mastitis, a number of cysts being scattered throughout the breast tissue. The main cyst, one of considerable size, was dissected out, together with some amount of the surrounding mammary substance. Some doubt was felt at the time of operation as to whether the condition was simply that of chronic mastitis, and it was decided to await the pathological report before proceeding further.

A microscopical examination was made, but it showed that interstitial mastitis alone was present. The epithelium and connective tissue displayed great activity, but there was no evidence of malignant change. The patient was discharged, and advised to report herself at frequent intervals for examination. This she did fairly regularly at first, but towards the end of the year she failed to do so, and in May 1903 she was re-admitted in the following condition:—

“There is a large swelling above the right nipple about 5 inches in diameter, the skin over it is red.

“The swelling is soft and fluctuant, adherent to the deep structures, but not to the skin. A second lump, $1\frac{1}{2}$ inches in diameter, is placed below the inner end of the right clavicle; it is firmer and more fixed than the former. A third mass, which

forms no obvious prominence on the surface, is placed immediately beneath the nipple, it is very hard and tender, and it occupies the position of the incision of the previous operation. There is no enlargement of the axillary or supraclavicular glands."

The diagnosis of cystic sarcoma was made, and the condition was considered inoperable. The patient was accordingly discharged, and subsequently she went to the New Hospital for Women, where the same opinion was held. I heard some months afterwards that she had been subjected to a form of treatment by means of hypodermic injections, it was said with benefit ; but I was unable to prevail on her to come up for examination, and I now learn that she died in August 1904.

Case 5. Age 29.—This patient was admitted with a swelling the size of a walnut in the right breast. Its presence had been noticed for seven weeks.

The tumour was well defined, fluctuated, and was not attached to the skin, though it appeared to be somewhat fixed to its deep relations.

It was slightly tender on manipulation. There were no enlarged glands. At the operation, a cyst, the wall of which was blended with the surrounding breast tissue, was excised. April 7th.

On July 15th, she was readmitted with a hard, extensive tumour in the right breast. She had noticed it for some time, but, thinking it was the scar of the previous operation, she did not trouble about it.

During the two or three weeks preceding her admission the swelling had increased rapidly, and had caused her great pain, the pain shooting down the arm into the hand.

The mass was firmly fixed to the pectorals and extended into the axilla, where there were several enlarged glands. Retraction of the nipple was not obvious owing to the presence of the old scar. The skin was adherent to the tumour, but at the lower part there appeared to be a small cyst overlying the growth.

A free operation was undertaken and the tumour and glands were removed. Subsequently enlarged glands were noticed in the opposite axilla.

These also were dissected out some three weeks after the major operation, and they appeared to be carcinomatous,

Microscopical examination confirmed the diagnosis of both primary and secondary growths.

Case 6. Age 40.—The patient was admitted with a hard lump easily felt and seen in the left breast, which was considerably enlarged.

There was no retraction of the nipple, and the tumour did not appear to be adherent to the skin or deep structures. There was a good deal of induration in the right breast. Some small glands were palpable in axilla.

At the operation an exploratory incision revealed a mass of indurated breast tissue containing a number of cysts, and in the centre of the mass was a nodule of scirrhus.

This diagnosis was confirmed by microscopical examination.

Case 7. Age 52.—The patient was admitted with a large mass in the right breast. Some two months before admission the patient noticed a small tumour in the mamma. The swelling increased rapidly and caused her considerable pain.

On examination a large mass the size of an orange could be felt in the right breast. It was exceedingly hard, did not fluctuate, was not adherent to the skin, but was attached to the pectoralis major. The glands in the axilla were enlarged.

At the operation a large growth more or less separate from the breast tissue was removed. It possessed a capsule, but this was mostly formed by the flattened-out, glandular tissue around the growth.

The breast was the seat of marked interstitial mastitis, and there was considerable induration. Macroscopically, the tumour presented the features of a rapidly growing soft sarcoma. Microscopically, it was found to be an exceedingly active adenoma with cyst formation. The interstitial mastitis was considered accountable for the enlarged glands.

Case 8. Age 39.—A spare woman, who was admitted with a number of hard nodules in both breasts. These had been present for some years, but recently they had become painful. Both breasts were badly developed, and full of nodules varying in size from that of a pea to that of a filbert. They were freely movable, but painful, and they did not fluctuate. The glands in the right axilla were palpable.

The left breast was removed, and the report of the sections was that they were fibro-adenomatous.

Subsequently the right organ was amputated, a similar condition being present. The breast tissue generally showed the characteristics of interstitial mastitis.

Space will not permit me to indefinitely multiply my cases, but I will just mention two more. In both instances, the clinical condition was similar, namely, a small movable lump was present in the breast. The age was under 30 in both instances. The swellings had existed for some months. They were hard, movable, and painless, and there appeared no reason for regarding them as malignant. Previous to operation the diagnosis in each case was that of fibro-adenoma; but incision and subsequent microscopical investigation revealed in the one a carcinoma, in the other, an irregular celled sarcoma. In each case the breast was ultimately removed.

The practical interest of these cases may be summed up under three headings:—

1. What is the relationship between adenomata and interstitial mastitis?
2. What is the relative position of both to malignant disease?
3. How is a differential diagnosis to be made?

WHAT IS THE RELATIONSHIP BETWEEN ADENOMATA AND CHRONIC MASTITIS?

It will be necessary to discuss for a while the pathological changes met with in these two conditions.

The adenoma is said to be an independent new growth starting from the hyaline connective tissue, rich in nuclei, around the acini and ducts.

According to the relative activity and proportion of the constituent elements, epithelium and connective tissue, different appearances will be presented. If the connective tissue is markedly in excess, the simple slowly-growing fibro-adenoma results; it is doubtful if a pure fibroma ever occurs. If, on the other hand, the glandular structure is especially active, an adeno-fibroma, or even a pure adenoma, will be developed.

Should the epithelial activity be accompanied by a cystic degeneration or formation, a peculiarity of many adenomata, the growth is rechristened with a number of confusing synonyms: cysto adenoma, adeno sarcoma, diffuse hypertrophy, &c.

Given a small cystic adenoma with an intracystic growth, a new term is found, a duct papilloma, and so, with misplaced ingenuity, a number of names are coined for a series of varied conditions arising as the result of the same essential process, namely, an irregular and abnormal development of the connective tissue and epithelium in the breast.

The difference between these forms depends, not only upon the proportion of epithelium to connective tissue, but upon the relative activity displayed by both elements. In the fibro-adenoma the growth is slow, as shown by the perfect fibrous formation: the epithelium is but slightly active.

From this form we approach, through intermediate stages, to the type of rapid, ill-ordered growth, where the activity of both epithelium and connective tissue is pronounced. These growths, the soft adenomata in truth, approach closely to that vague border-line which separates the simple from the malignant; indeed, in looking at sections of some of them one hesitates to pronounce on the side of innocence. The epithelial cells show active karyokinesis, the stroma is richly cellular and vascular, its cells not receding to the mature fibrous type, but remaining embryonic, or, if the term be permitted, pseudo-sarcomatous.

In chronic mastitis we recognise two forms: lobar and lobular. The terms are not satisfactory. Anatomically, the breast cannot be divided into lobes, but consists of a number of lobules ramifying in the surrounding connective tissue-bed, the extent of the organ being considerable.

If the mastitis were limited to one quadrant, it would be correct to describe the condition as localised; if affecting to whole region, diffuse; but any division into lobes, or any distinction based on such division, must be artificial and inaccurate.

The French pathologists draw a distinction between the two forms in considering that localised mastitis is the result of a parenchymatous, the diffuse of an interstitial inflammation. Be this, as it may be, true of some cases, there are many others in which after examination it has not been possible to draw any such distinction, and, I take it, that here, as elsewhere, the inflammatory process cannot be confined to any one element of the organic whole, but that, as in the

case of the kidneys, parenchymatous inflammation will, of necessity, be associated with an interstitial change, and *vice versâ*.

Again, in several instances where the localised mastitis was present, a careful examination has revealed that the whole breast was suffering though to a less extent, the process having been determined to one or other locality.

Pathologically, the process of interstitial mastitis consists in abnormal proliferation of connective tissue and epithelium under the influence of some stimulus, injury, infection, or the period of declining years. This latter suggestion has always appeared weak. There seems no very good evidence to show that the decline of physiological activity should produce such marked pathological change. In many cases the disease is found in comparatively young women long before the menopause, while a respectable number of women preserve a well-formed and healthy breast years after the period of child-bearing is over.

There is no corresponding atrophy of the uterus, at least not until a much later period, nor does a pronounced interstitial orchitis mark the time of virile decadence.

Diffuse mastitis presents itself in a number of clinical as well as pathological cloaks.

1. The general induration, the diffuse lumpiness, without a definite and discrete tumour, affecting both breasts, accompanied by pain and often enlargement of the axillary lymphatic glands.

2. The disc-shaped mass, a firm, definite tumour, so similar to the adenoma that it is hard to distinguish between them. The whole breast, which has usually been poorly developed, will be found matted up into this swelling with the onset of the inflammatory change; it has undergone a most marked reduction in volume owing to the cicatrising of the connective tissue.

3. The general cystic disease. Clinically, we meet with cases where a single cyst alone attracts the attention of the observer. The size of the cyst may vary from that of a walnut to that of a hen's egg, but in all of them other cysts will be found scattered through the breast substance, cysts which have not yet attained the full maturity of development.

4. The fibro-adenomatous variety, where the final stages are represented by the appearance of fibro-adenomatous nodules

scattered through the inflamed breast substance. This seems to be a rare condition. Case 8 is an example of it.

As in the fibro-adenomata the relations of epithelium to connective tissue to one another determined the type of growth which would appear, so in diffuse mastitis, the clinical and pathological variety will depend upon the mutual proportions and activity of these elements.

If the connective tissue is chiefly affected, a fibrous mass with little glandular change will be the result, but, on the other hand, should the epithelium suffer, the cystic disease will probably be found. Clinically, there are many points of similarity between cases of adenoma and mastitis; pathologically, in each the same essential process is at work, though the adenoma has its peculiar capsule; but it would be only fair to say that this capsuled adenoma does not appear to be nearly so common as is supposed, and many cases diagnosed as such have turned out to be instances of diffuse mastitis with localised fibro-adenomatous nodules. In looking through the notes of some hundreds of cases of diseases of the breast, I have been struck with the comparative rarity of this form of tumour.

I would suggest that adenomata are the result of some very local irritative lesion, whereas the process is more widespread in diffuse mastitis, and it seems that the similarity between these two forms of breast disease is a further point in favour of the theory that inflammation has at least some bearing upon tumour formation.

In short, the main distinction which exists between these two conditions is that, while in diffuse mastitis a proliferative process, with more obvious inflammatory phenomena, is scattered through the breast substance, in adenomata a local proliferation is found, surrounded by a capsule derived from the above-mentioned hyaline layer.

The subject of general cystic disease is one that has been much debated. The very confusion which has existed in its nomenclature and classification shows that a distinction between a new growth and an inflammatory supplement has been impossible.

Described by Sir Benjamin Brodie as serocystic disease, by Cæsar Hawkins as tubercystic disease, it was looked on by these authorities as the result of an inflammatory process, with fibrous obstruction of the ducts. Birkett, on

the other hand, regarded it as a variety of the adenoid tumour.

The same uncertainty appears to have existed with regard to the prognosis, for whereas in some tumours containing cysts with an inactive stroma, recurrence was considered impossible after removal, in others where the cells were active it frequently occurred.

Brissaud and Malassez described the disease as "epithelioma acineux intrakystic," regarding it as an epithelial growth, with on the whole a malignant tendency.

Quenu and Delbet, 1888, following the work of Brissaud, concluded that the condition is "une sorte de sclérose d'inflammation chronique avec prolifération primitive de l'épithélium des acini."

Gaudier and Surmont offered the same explanation, considering that there was a streptococcal infection of low virulence, but Renon's work failed to confirm these observations.

Such conflicting statements can only be brought into harmony with one another if we are prepared to admit some relationship between adenomata and diffuse mastitis.

Cyst formation, it is agreed, occurs in some adenomata, cystic change is undoubtedly found in mastitis. It is possible, therefore, that the final stage of these two conditions, pathologically related, clinically similar, and etiologically closely allied, may be a general cystic change, although it must be confessed that in cases where the cyst formation is widely scattered through the breast substance definite inflammatory rather than neoplastic features predominate.

It would seem, then, that these cystic tumours result from an active epithelial proliferation, under the stimulus of some infection at present unknown.

WHAT IS THE POSITION OF ADENOMATA AND MASTITIS WITH REGARD TO MALIGNANT DISEASE ?

The details of some of the cases recorded above will be an answer to this question. Within a year from the detection of, and the operation on, a cystic breast there developed in one instance a sarcoma, in the other a carcinoma. It is true that the sarcoma was not examined microscopically, so that the evidence in this case cannot be regarded as entirely

complete, in the other case there can be no doubt, as both growth and glands were microscoped.

Whatever views may be held with regard to the relationship of mastitis to adenomata, there can be no doubt as to its potentiality for undergoing a malignant change.

The unstable state of the tissues brought about by a chronic mastitis is eminently favourable for the development of either a carcinoma or sarcoma, and forms a fertile soil for the anarchic growth of a cancer cell, and it has often been difficult, after examining a portion of breast affected with this disease, to say whether a malignant formation was or was not occurring.

Reclus, in *La Tribune Médicale*, for May, 1905, contends that this cystic condition is not, in his experience, followed by malignant change, an experience entirely different from ours.

The adenoma is a simple tumour, that is to say, it follows certain arbitrary and inadequate lines of definition laid down by some pathologists. Every neoplasm is potentially malignant, and although in the vast majority of cases that power is never expressed, the latent force is there, and may at any moment be waked into activity.

There are hundreds of instances in medical literature where a simple tumour has undergone a malignant change, and there is no form of simple growth which is free from this reproach.

Broadly speaking, all tissues have an infinite capacity for development, and constant reproduction is taking place to make good the wear and tear, but under normal conditions this tendency to proliferation is kept in check by an unknown force, which we may call "tissue tension."

A simple tumour is one of the earliest expressions of weakness of this controlling force, it is a note of warning telling us that the tissue tension is strained to breaking point.

New growths are cyto-infections, the cells are unruly members of a complex household, unrestrained by the influence of the surrounding tissues, they proliferate in an abnormal and irregular manner, and by their precocity may bring about the death of their parent being.

In studying infective inflammations, we recognise the controlling influence of certain cells limiting the process and affecting the result, and we often meet with ineffaceable

remains of the battle in some old organised nodule, or buried caseous patch.

So it is in the case of neoplasms ; if they remain simple, it is because the restraining influences have held them in subjection.

The tumour cells are like the micro-organisms, they grow and invade ; the capsulated, simple growth is like the old calcareous tubercle, the cancerous mass like the spreading miliary infiltration.

In carcinoma and sarcoma, the cyto-infection is more virulent and active while the tissue resistance is low, the result being that the process spreads with a greater or lesser degree of rapidity.

HOW IS A DIFFERENTIAL DIAGNOSIS TO BE MADE ?

Looking back on the above list of cases and having in mind many more, I do not know. There is, of course, no question when the well-known signs of scirrhus are present, which the veriest tyro recognises with confidence and joy ; but it is with the early cases, where an operation undertaken at once will have every prospect of success, it is with these that we find the greatest difficulty.

In Cases 1 and 2, the clinical resemblance was great, the pathological distinction obvious, in each the same disc or lens-shaped movable mass was present, but in the second both breasts were affected, in neither instance were the glands enlarged, the age and general condition of the patients very similar. The first was an example of a soft, rapidly-growing adenoma, the second of one of the varieties of interstitial mastitis.

Cases 4 and 5 were clinical puzzles. In each the same condition was found at operation, namely, diffuse mastitis with cyst formation. There was no evidence of further mischief, and the microscope afforded no additional information ; and yet in 4, the younger woman, a rapidly-growing carcinoma supervened, and in 5, a malignant form of sarcoma.

Case 3 showed the clinical signs of a cyst, that cyst upon investigation was the seat of malignant disease. Had the cyst been treated by aspiration or injection, the carcinoma, at a favourable stage, would have been overlooked. Case 6 is similar to the preceding.

Case 7 was apparently a scirrhus. Here was a woman of 52 with a hard, fixed mass in the right breast, it had grown rapidly, the axillary glands were enlarged. What other diagnosis but that of cancer was permissible, and yet it was wrong. The hard growth was a soft, rapidly-growing adenoma, the hardness being due to the indurated breast tissue which overlay the swelling, the fixation and the glandular enlargement to the same cause.

Case 8 should have allowed fluctuation in the nodules, and the clinical picture of multiple cystic disease would have been present.

Again, there was a surprise, the nodules were solid, solid fibro-adenomata, a late stage of diffuse mastitis. Instead of passing on to cyst formation, the connective tissue, not the epithelium, had been abnormally alert and active, and the chief expression of the old inflammation was in the development of fibrous tissue round the ill-formed breast acini.

A correct diagnosis was impossible in the last two cases previous to incision and section, and indeed there was no suspicion of anything malignant in the second until the microscopical examination had been made.

If all these cases were to pass before me again, I fear I should make the same mistakes, for I do not see how a correct diagnosis could be arrived at, at least without preliminary incision.

There are no means at present, apart from the microscope, and that occasionally fails us, of diagnosing with certainty a malignant change at an early date, and until our poor fingers can attain that acme of tactile skill, of which I have read but which I have never witnessed, whereby they can detect the microscopic scirrhus in a voluminous cystic or inflammatory breast, it will be right to view with profound distrust all tumours in this region, be they hard or soft, be they solid or fluid.

It will be wise to explore and remove those tumours thoroughly and quickly, not necessarily because they are at the time malignant, but because following the order of things they may become so.

NOTES ON THE DIAGNOSIS OF PERNICIOUS ANÆMIA.

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THESE notes on the blood changes of pernicious anæmia are the results of the study of 53 blood counts in 13 cases, and are an attempt to bring out the points that are of practical value in the diagnosis and prognosis of the condition. The number is not large, but the results are, on the whole, confirmatory of the results of other observers.

In an established and well-marked case of pernicious anæmia, there is usually not much difficulty in making the diagnosis from the blood-examination alone, and where this is characteristic the diagnosis is certain, whatever the clinical facts may be, excluding only those cases in which the blood-changes are accompanied by carcinoma of the stomach, or caused by *bothriocephalus latus*. The following are the features seen in a typical case:—(a) a high colour-index, (b) the presence of megaloblasts, and (c) of megalocytes, (d) leucopenia, with (e) relative lymphocytosis, and (f) polychromatophil, and other forms of degeneration of the red corpuscles. I will discuss these signs in the order given.

(a) The high colour-index is mentioned first, since it is in itself a very characteristic sign, and is, further, usually the first clue afforded to the nature of the disease. A high colour-index should always raise the suspicion of pernicious anæmia, and lead to a full and careful examination of the blood. Here a word of caution is necessary, since for the accurate determination of the colour-index the number of red corpuscles and the percentage of hæmoglobin must both be estimated with all possible accuracy, otherwise the error will be large. The probability is that, if no special care is taken, there is a possible error of five per cent. in the enumeration of the corpuscles. With many hæmoglobinometers there is an error of ten per cent., and with some very much more. Now, if, in an examination of a blood having 20 per cent. of hæmoglobin and 1,000,000 red corpuscles per cubic mm., these errors crept

in, the colour-index might be estimated as high as 1·27, or as low as ·7. With care the error in the enumeration of the red corpuscles may be reduced to about two per cent., and when the hæmoglobin is estimated by Haldane's hæmoglobin, it is easy to get within two per cent. of the proper amount. Oliver's apparatus also gives very good results; but for simplicity, accuracy, and ease of manipulation, no instrument can be compared with Haldane's, which should be in the hands of every physician. As a small practical point I may mention that it is convenient, when making examinations by the bedside, to use water which has been saturated with CO by bubbling coal-gas through it, instead of carbonising the blood after dilution with plain water. The solution keeps two or three days, if well stoppered, the process is shortened, and available in the absence of a supply of gas at the patient's house.

The following table shows the nature of the colour-index in 44 counts of pernicious anæmia, and in 55 cases of secondary anæmia. These latter were selected so as to include, as far as possible, those most likely to be mistaken for pernicious anæmia. Most female cases were excluded, since in these there might have been an element of chlorosis, which would unduly lower the average index, and render the resulting figures more unlike those of pernicious anæmia. A few cases in which there was a high colour-index in other diseases have been excluded, to be mentioned separately.

—		Pernicious Anæmia.				Secondary Anæmia.			
No. of Corpuscles.		Average.	Maximum.	Minimum.	Cases.	Average.	Maximum.	Minimum.	Cases.
Under 500,000 -	-	1·6	1·8	1·3	8	—	—	—	—
500,000-1,000,000 -	-	1·4	1·75	1·1	7	—	—	—	—
1,000,000-2,000,000 -	-	1·23	1·8	1	14	·77	·97	·6	5
2,000,000-3,000,000 -	-	1·2	1·3	1·1	8	·82	·99	·5	20
3,000,000-4,000,000 -	-	·99	1·1	·87	4	·82	1·1	·5	17
4,000,000-5,000,000 -	-	1	1·12	·9	3	·8	1·1	·5	18

This table shows that in pernicious anæmia, as a general rule, the index is higher than normal ; and that the greater the degree of anæmia the higher the index. This latter point is better seen by a series of examinations of the same case. Where these are made the rule is for the index to rise as the patient gets worse, and *vice versa*. Thus, in one case that got worse rapidly the indices on six successive counts were 1, 1·1, 1·18, 1·2, 1·3, and 1·8 : the reds being 1,200,000 : 840,000 : 820,000 : 720,000 : 628,000 and 412,000 respectively. After a time there was a slight improvement and the index fell to 1·6 and 1·4, whilst the reds rose to 512,000 and 600,000 respectively. On the other hand, with an increasing secondary anæmia the index has a tendency to remain constant at about ·8, or even to fall.

The cases of pernicious anæmia with from 3,000,000 to 5,000,000 red corpuscles, in the above table, are those in which patients, suffering from the disease in a typical form, gradually improved. I do not know whether it is permissible to argue from these to early cases of pernicious anæmia. Assuming that it is, we may gather that in any case with more than 3,000,000 red corpuscles, the diagnosis is unlikely to be pernicious anæmia if the index is below ·9, whilst, if the total reds are *below* 3,000,000, with the same colour index or with a lower one this is almost a certainty. Where the count is still lower, the index must be higher still, or the diagnosis of pernicious anæmia may almost be excluded on this examination alone.

At the same time a high colour-index, in these circumstances, is not a certain proof of pernicious anæmia, as it is occasionally met with in other conditions : such counts have been deliberately excluded from the above table, since they are very exceptional, and are best dealt with separately. The most important are two cases of carcinoma of the stomach, one of which was examined by Dr. Grünbaum, the other by myself. In the former, with a total count of 4,000,000 reds, the colour-index was 1·15 ; in the latter, with a slightly lower number of reds, it was 1·2. In each case the leucocyte count, which was typical of a secondary anæmia, gave a clue to the diagnosis. There were also three cases of purpura hæmorrhagica, in which a low colour index is the usual rule. These cases are of some interest. In two of them, again, the leucocyte count indicated the diagnosis, whilst the other (a case

under the care of Dr. Dalton) was an example of the condition, known as "non-infectious idiopathic purpura hæmorrhagica," and considered by Ehrlich to be pernicious anæmia without characteristic changes in the blood or lesions in the bone-marrow. The patient had 816,000 red corpuscles, a colour index of 1.1, and 6,800 leucocytes, 80 per cent. being lymphocytes. No nucleated reds were seen, and there was much polychromatophil degeneration. I thought the case was probably one of pernicious anæmia, but she died in a few days, and there was nothing to support this view at the autopsy. Another case of high colour-index was one of cachexia strumipriva. In this also the leucocyte count raised suspicions of pernicious anæmia, but I was unable to trace the further history of the patient. There have been isolated examples of a high index in other diseases, but other considerations rendered the diagnosis easy.

A high colour-index is very common in von Jaksch's anæmia. (I have seen it as high as 1.8.) Here, however, the other blood-changes make a fairly characteristic picture, the chief reliance being placed on the large number of normoblasts (10,000 per cubic mm. in one case I have examined), many of which show double, triple, or multipartite nuclei, and the high leucocyte count. The occasional presence of megaloblasts in this disease is to be noticed, as is also the very frequent occurrence of punctate basophile granules in the red cells, which is far more common here than in any other affection.

Occasionally, the index is slightly raised in other primary blood-conditions, especially in myelogenous and lymphatic leucocythæmia, though here less reliance can be placed on the accuracy of the measurements, which may be interfered with by the large numbers of leucocytes.

(b) Megaloblasts are large nucleated corpuscles, but no exact limit of size can be given above which a nucleated corpuscle is to be regarded as a megaloblast, whilst those below it are considered as normoblasts. In general, a cell cannot be recognised with certainty as a megaloblast, unless it is more than 12μ in diameter, *i.e.*, $1\frac{1}{2}$ times larger than a normal red corpuscle. But the character of the nucleus is usually sufficient to determine the point. The nucleus of a normoblast stains very deeply, more deeply than any other nucleus found in the blood, and is circular, and (in perfect preparations) centrally placed. The nucleus of the megaloblast

blast may be larger or smaller than that of a normoblast, but it always stains much more faintly, and is often excentric. It may be fragmentary, vesicular, vacuolated, or double, or may show mitotic figures: the latter are specially important, and are only seen in pernicious anæmia, of which they may be regarded as the most conclusive (though rare) sign.

Megaloblasts are present, at one time or another, in nearly all cases of pernicious anæmia, but the failure to find them on any given occasion is not of great importance as evidence against that disease. It frequently happens that none are found after a prolonged search on several occasions, whereas on others they are present in considerable numbers. Some cases run their whole course without the presence of megaloblasts—at any rate, without their being detected. In one case, otherwise typical, none were found in six examinations, spread over a period of six months; in another, a single example was found in fifteen examinations. Normoblasts were present, though not numerous, in all these cases.

I consider megaloblasts to be “absent” when none are found after a careful search through two well-spread films. If a longer examination had been made, in some of these cases, an isolated example might, of course, have been found, but considerations of time usually prevent this being done. If it were possible to make a definite diagnosis in this way it would, perhaps, be a duty to search through many films where pernicious anæmia is in question; but, seeing that neither the presence of megaloblasts in small numbers, nor their complete absence, is absolutely pathognomonic, I consider that the prolonged searches, which some observers consider necessary, are a waste of time, besides being impracticable in ordinary clinical work. It is especially important that the presence of megaloblasts fails us in the diagnosis of the slighter cases. I have never found them when the red corpuscles were over 3,000,000, and rarely when they were between 2,000,000 and 3,000,000, whereas they occur in the great majority of the examinations in which the reds are between 1,000,000 and 2,000,000. It is a common occurrence, in watching a case improve, to find the megaloblasts gradually decrease and finally disappear when the red corpuscles reach the number of 1,500,000 or 2,000,000. The presence of megaloblasts without that of other blood-changes indicative of pernicious

anæmia is not sufficient for a diagnosis, since it occurs, though very rarely, in severe secondary anæmia, and more commonly in children. I think the cells are almost certain to be detected in von Jaksch's anæmia, if a sufficiently careful search is made.

The ratio of megaloblasts to normoblasts has been considered of importance. Ehrlich enunciated as a law that in pernicious anæmia the megaloblasts outnumber the normoblasts, and Lazarus goes so far as to consider their simultaneous occurrence as a rarity. This is not the experience of other observers. Cabot, for instance, found in 139 examinations, that normoblasts were always present if megaloblasts were found, and Coles found that, in early cases of the disease, the normoblasts may predominate. I have no extended series of numerical observations on which to base my opinion; but I believe that the presence of normoblasts is the rule, and as would be expected on theoretical grounds, that it is a good sign if considerable numbers are present. I have once seen a case improve rapidly after a "blood crisis," in which large numbers of normoblasts suddenly made their appearance. A similar case has been recorded by Dorn. There is, however, no doubt that the presence of numerous megaloblasts is of most evil prognostic import.

(c) The presence of megalocytes is in some respects more important than that of megaloblasts, since they are so much easier to find (forming, in marked cases, a large proportion of the corpuscles), and since they persist whilst the case improves long after the megaloblasts have disappeared. The presence of any considerable number of megalocytes is of high diagnostic importance. Coles holds that unless 33 per cent. of the corpuscles are distinctly oversized the diagnosis of pernicious anæmia should be made with reserve. This is probably true, but I am endeavouring to show the points to be relied on in forming a *probable* diagnosis in the slighter cases of the disease. Lazarus gives a series of results useful in this respect:—

		Per Cent. of Megaloblasts.	Average.
Severe cases	- 8	71 to 56	60·5
Improving cases	- 5	50 „ 33	42
Complete remission	5	14 „ 3	8

It is to be noted that megalocytes persist even after a complete remission of the symptoms, and may even reach 14 per cent. I do not know what the blood condition was in the cases of complete remission, but in one case, at present under observation, in which the red corpuscles are 4,000,000, and in which the blood shows no other signs of the nature of the disease, more than 20 per cent. of the corpuscles are distinctly oversized. If it is safe to argue from the remissions to the onset of the disease, we should expect the presence of megalocytes to be one of the first changes to attract attention.

The method of estimation of the megalocytes may be mentioned. Where their mere presence is to be noted, the simplest way is to apply Shattock's method for the comparison of two specimens of blood. The film (stained) from the patient is to be mounted face to face with a stained film of normal blood, and the two cover-glasses mounted on a slide. A slight turn of the fine adjustment will allow the one or other film to be brought into focus at pleasure, and the relative size of the two sets of corpuscles can be easily determined. Another simple method is to make use of the Thoma-Zeiss counting chamber. The lines intersecting the double-ruled squares are 25μ from the edges. The average size of a red corpuscle is just over 8μ , or one-third of this distance; the average size of a megalocyte is about 12μ , or nearly half this distance, and larger forms are often seen. Thus, the presence of megalocytes may be determined whilst the red corpuscles are being counted. Where more accurate methods are required a micrometer must be used, or, better still, Dr. Wright's eikonometer, which permits the diameter of the corpuscles to be read off directly.

Another method of investigation, which has not been much employed, is to determine the average size of the corpuscles. In health the volume of the corpuscles, as determined by the hæmatocrit, or similar methods, forms from 50 to 54 per cent. of the total volume of the blood. Now a cubic millimetre contains 1,000,000,000 cubic micromillimetres (μ^3), and in a cubic millimetre of blood the corpuscles occupy a volume of about 500,000,000 μ^3 . These number about 5,000,000, so that the average volume of a corpuscle is about 100 μ^3 . Where

many megalocytes are present (unless small-sized forms are present at the same time, as is often the case in pernicious anæmia) the average volume will be raised. In the case quoted above, as having 20 per cent. megalocytes, on a total count of 4,000,000, the average volume was $117 \mu^3$. In secondary anæmia, the size of the corpuscles is almost uniformly reduced, and megalocytes absent, or are very few. In cases in which the colour-index is high in secondary anæmia, the usual finding is that most of the corpuscles are decidedly large, but there are very few that can be called megalocytes.

(d) *The Leucocytes.*—The following analysis of 93 blood-counts in pernicious and secondary anæmia, though the numbers are not large, is fairly characteristic, and indicates also the importance of the leucocyte count in diagnosis. I may say the cases of secondary anæmia were selected to resemble,

Red Corpuscles.	Pernicious Anæmia (40 Cases).								
	Total Leucocytes.			Polynuclears.			Lymphocytes.		
	Average.	Max.	Min.	Average.	Max.	Min.	Average.	Max.	Min.
Below 500,000 - -	2,495	3,700	1,100	24.4	41	16	72.9	79.5	55.5
500,000—1,000,000 -	2,780	5,400	1,100	39.6	48.8	20	60.4	72	51.5
1,000,000—2,000,000 -	6,000	9,280	3,400	51	71.5	17.2	42.8	80.4	24.5
2,000,000—3,000,000 -	3,050	4,200	2,500	52.5	66	37.2	39.6	49.6	25
3,000,000—4,000,000 -	8,225	13,950	2,500	51.5	64.2	28.2	40.8	59.5	28.2
4,000,000—5,000,000 -	9,800 (5 cases only.)	10,000	9,600	46.8	65.2	30.5	45.6	58	34

Continued.

Red Corpuscles.	Secondary Anæmia (53 Cases).								
	Total Leucocytes.			Polynuclears.			Lymphocytes.		
	Average.	Max.	Min.	Average.	Max.	Min.	Average.	Max.	Min.
Below 500,000 - -	—	—	—	—	—	—	—	—	—
500,000—1,000,000 -	—	—	—	—	—	—	—	—	—
1,000,000—2,000,000 -	10,000 (5 cases only.)	15,000	3,400	83.5	86	81	10.8	12	9.6
2,000,000—3,000,000 -	9,308	16,000	7,300	78	92.5	69	16.6	26	11
3,000,000—4,000,000 -	11,700	18,000	7,000	71.7	85	64.2	22.1	35.5	11.6
4,000,000—5,000,000 -	11,162	20,800	8,000	75.5	87.5	65	17.4	22.8	10

so far as possible, those in which the question of pernicious anæmia might arise, and include anæmia due to cancer of the stomach,¹ and other forms of internal malignant disease, toxic conditions, chronic latent sepsis, &c. Most of the patients were men, and no female case in which there was any probability of chlorosis was included, and all cases in which there was suppuration were also excluded. The leucopenia and marked relative lymphocytosis in the later stages of pernicious anæmia are well shown, and a study of the leucocytes in the milder grades shows that, in comparison with secondary anæmia, the tendency still persists. Thus, in eight cases of pernicious anæmia where the reds were between two and three millions the average leucocyte count was 3,050, whilst in thirteen corresponding cases of secondary anæmia it was 9,300. These figures indicate, so far as they go, that the diagnosis of pernicious anæmia is very unlikely if the leucocytes are present in increased numbers, and can almost be excluded if there is leucocytosis. It also indicates that a rise in the number of leucocytes is of good omen. This is better shown by series of counts in the same patient. For example, in five successive counts, in a patient under Dr. Tirard, the figures were :—

		Red Corpuscles.	Colour Index.	Leucocytes.
June 19	-	1,304,000	1·1	4,300
June 29	-	1,208,000	1·4	1,400
July 14	-	1,488,000	1·2	5,000
July 24	-	1,986,000	1·05	8,200
August 30	-	3,968,000	1·12	9,600

In which there was a slight increase in the anæmia accompanied by a fall in the leucocytes, followed by an improvement accompanied by a rise.

The significance of these results arises from the fact that—excluding typhoid fever and tuberculosis—leucopenia with relative lymphocytosis is a somewhat infrequent phenomenon, and is still more rarely associated with anæmia of hidden origin. The reason is obvious. In any anæmic condition in which the bone-marrow is in a healthy state, the tissue is stimulated to

¹ I need not point out that in some cases carcinoma of the stomach may be associated with a blood condition identical in all respects with true idiopathic pernicious anæmia.

abnormal activity, and this activity affects its leucocyctogenic, as well as its erythroblastic powers,¹ so that the polynuclear leucocytes are formed in increased numbers. In pernicious anæmia the two functions are in default together, and, as a result, the lymphocytes are the only corpuscles that reach the blood in undiminished numbers, and therefore appear to be increased. In some cases of pernicious anæmia, however, there is probably an actual, though slight, diminution in the numbers of the lymphocytes themselves. But in some cases of severe anæmia of diverse origin there are quite similar blood-changes, and these must be taken to mean that in them the bone-marrow is structurally altered, or that its activity is depressed by toxic or other agencies. The case of purpura hæmorrhagica with high colour-index, leucopenia, and relative lymphocytosis, has already been referred to. At the autopsy profound lesions were found in the bone-marrow, which was reduced to a lymphoid mass, with scarcely any erythroblasts or granulated cells.

A very similar blood-condition is sometimes seen in acute cases in which the clinical symptoms are those of acute lymphatic leucocythæmia, but in which there is a normal or lowered leucocyte count, instead of a great excess, and in these also there may be a high colour-index. I have notes of two, and possibly three, such cases. In one, the leucocytes varied between 1,600 and 3,000, whilst the red corpuscles were about 1,000,000, and the lymphocytes rose to 50 per cent. In another (under the care of Dr. Tirard) three successive counts gave the following figures :—

	Reds.	Colour Index.	Leucocytes.	Lymphocytes.
August 24 -	3,944,000	·85	9,600	No other cells seen in three films.
September 2	2,922,000	1	9,800	75·2 per cent.
September 4	2,432,000	1·12	10,000	72·8 „ „

The gradual rise in the colour-index, accompanying the decrease in the number of red corpuscles, is worthy of notice. No megalocytes were seen at any time, though the reds were always full-sized. Such cases, whatever be their exact


¹ In addition to this most of the causes of secondary anæmia are inflammatory or toxic, in origin, and there is a leucocytosis of ordinary type.

nature, are evidently accompanied by great disturbances of the bone-marrow. Their clinical history will always suffice to differentiate them from pernicious anæmia. The association of leucopenia with "splenic anæmia," if there be such a disease, must also be recognised. In a single case of pernicious anæmia (under Dr. Dalton), there was a very remarkable occurrence, which is of much theoretical interest. At the first examination the leucocytes were 9,600, but no differential count was made. The patient was suffering, as is so frequently the case, from oral sepsis. Eleven days later he had developed an abscess in the mouth, and the count gave, leucocytes 57,000 per cent. mm., polynuclears, 34 per cent., lymphocytes, 58 per cent. (These two counts are excluded from the table.) Nine days later (after the abscess had healed), the count was, total leucocytes, 4,000, polynuclears, 27, lymphocytes, 63 per cent. It is evident that the high grade of leucocytosis caused by the suppuration, was due to the influx of lymphocytes to a greater extent than to that of the polynuclears. Comparing the last two counts, we may assume that 30,000 lymphocytes and 18,000 polynuclears were attracted into the blood-stream. This is of much theoretical interest, and has a practical bearing on the diagnosis of lymphatic leucocythæmia.

(f) Polychromatophil degeneration is indicated by the fact that the red corpuscles stain to a greater or less extent with basic dyes in a neutral mixture—for example, with Jenner's stain they are coloured any shade from lilac to blue. The change is most common in the megaloblasts. It is very common in pernicious anæmia, but only in advanced stages, and its absence is not of importance, as it need not occur even when the reduction is very profound. It occurs also in other conditions, especially in von Jaksch's anæmia, where blue stained corpuscles often form a striking feature of the film, even when there is but a moderate grade of anæmia. In this latter condition there is another striking form of degeneration of the red corpuscles, punctate basophilia, shown by the presence of black dots in the corpuscles, which may be otherwise normal or polychromatophilic. This is very characteristic of severe grades of von Jaksch's disease, and occurs, though never as a marked feature, in pernicious anæmia. Poikilocytosis is another *banal* sign, and one which affords

no help in the slighter grades of pernicious anæmia, whilst it is not uncommon in severe secondary anæmias. As a general rule it is present in the pernicious forms whenever the red corpuscles are below 2,000,000. To this rule there are numerous exceptions, and, in one very severe case in which eight counts were made whilst the red corpuscles were below 500,000 poikilocytes were sometimes absent altogether, and sometimes present in very small numbers. It appears necessary to point out that poikilocytosis should be looked for in a wet preparation, between slide and cover-glass, without the addition of any diluting fluid, and not in a dried preparation, in which the cells are often deformed by pressure. Absence of rouleaux formation may be noted at the same time, but is unimportant.

In practice the diagnosis is best conducted on the following lines. Determine the colour-index, and, whilst counting the red corpuscles, notice incidentally whether any appear abnormally large, larger than $\frac{1}{2}$ of the diameter of the half-square on the counting chamber. If the index is so high as to arouse suspicions of the disease, proceed to make a leucocyte count. If this is low, make a differential count, on a stained film, keeping a sharp look-out for nucleated, polychromatophil, or punctate forms. If there is a relative lymphocytosis the diagnosis is very probable, and the films should be examined for megalocytes by one of the methods given. The next process is the most tedious, and consists in a further careful search for nucleated red corpuscles, whether megaloblasts or normoblasts, but, if all the previous signs are positive, I think a diagnosis may safely be made without their discovery. Lastly, a wet undiluted specimen may be examined for poikilocytosis and rouleaux formation.



THE DIAGNOSTIC VALUE OF THE LEUCOCYTE.

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THE interpretation of the significance of an alteration in the number and kind of white cells in the blood is as complicated as the actual process of enumeration is simple. It is impossible to state too emphatically, or too frequently, that under no conditions ought a diagnosis to be based upon the examination of the blood alone; for although malaria, leukæmia, relapsing fever, filariasis, tympanosomiasis, and a few other conditions can often be definitely diagnosed, nevertheless it is impossible to state that the disease, thus found, is the one of paramount importance at the moment. For instance, a case of filariasis might be suffering from pneumonia.

The diagnosis of a difficult case is arrived at, by carefully weighing the evidence for and against, each and every one of the diseases, which the general condition suggests. The result of the examination of the blood should be a part of the evidence, and the skill and experience of the physician must determine the importance to be ascribed to it, when it apparently points to a different conclusion from that which clinical signs and symptoms suggest.

The average number of white cells per cubic millimetre in the blood of normal man is 7,500. It must be remembered, however, that, not only are there considerable personal variations, but also a diurnal wave, the crest of which is reached towards two o'clock in the afternoon.

The presence of an abnormally large number (leucocytosis), or an abnormally small number (leucopenia), occasionally assists in diagnosis, for experience has shown that, in certain infections, a leucocytosis is present, whilst in others a normal number, or even a leucopenia, may be noted. Most infections cause a leucocytosis, the number being so great that it is wiser to remember the exceptions, which are Typhoid and Paratyphoid fever, Malaria, Influenza, Measles, Mumps, German measles, Tuberculosis (uncomplicated by secondary infections), and

Malta fever. The differential diagnosis between cerebro-spinal meningitis and enteric fever, enteric fever and pneumonia (before development of signs), scarlet fever and German measles, becomes greatly simplified when recourse is had to white cell count.

Some micro-organisms, amongst them streptococcus, staphylococcus, pneumococcus, meningococcus, produce toxins, which lead to a very marked leucocytosis, provided that the host possess good powers of resistance, and that the virulence of the injection be not so great as to produce death, before a reaction has taken place.

This increase in white cells is largely due to an increase in one kind of the four, which are present in normal blood.

It will be remembered that the four kinds of leucocytes are termed polynuclear neutrophil, lymphocyte, hyaline cell, and polynuclear eosinophil. The characteristics of each kind of cell, when stained by Leishmann's stain, are :—

Polynuclear neutrophil, 12μ diameter, multilobed nucleus, taking a violet-blue stain, finely granular protoplasm, the irregular fine granules staining terra-cotta colour.

Lymphocyte, about the size of a red cell, consisting of a large spherical nucleus of violet-blue colour, surrounded by a thin envelope of pale blue protoplasm.

Hyaline cell, about 12μ in diameter, contains a horseshoe-shaped nucleus, staining violet-blue, whilst the protoplasm of the cell is hyaline and of a blue tinge.

Polynuclear eosinophil, about 12μ in diameter, multilobed violet-blue nucleus in a protoplasm, which is closely packed with coarse spherical granules of a bright red colour.

Normally, the cells are in the following proportion :— Polynuclear neutrophil, 66 per cent.; lymphocytes, 28 per cent.; hyaline cells, 4 per cent.; eosinophil cells, 2 per cent.; but when a leucocytosis, due to infection with one of the above-mentioned micro-organisms, occurs, the percentage of polynucleus neutrophile leucocytes increases, and may rise up to, or even above, 90.

It is often difficult to decide, whether an inflammatory condition of tissues, some distance from the surface of the body, such as appendix, kidney, Fallopian tube, has led to the death of white cells, and to the formation of pus, which will

necessitate surgical assistance. In these cases, the examination of the blood is materially helpful.

The presence of a marked leucocytosis, 15,000 white cells per cubic millimetre, in the majority of cases points towards pus, but since there are, at least, 20 per cent. in which the leucocytosis is due to inflammation alone, further evidence is required, provided that the clinical signs are indefinite.

The absence of leucocytosis, in the presence of definite clinical signs of pus, or gangrene, must never stay the surgeon's hand, for, as stated above, when the resistance of the host is low, or the virulence of the infecting micro-organisms great, death may occur before a leucocytosis develops.

In doubtful cases, a white cell enumeration should be repeated four hours after the first, and, if the count is higher, one may safely conclude that the inflammation is spreading, or an abscess forming. If, in addition to the leucocytosis becoming greater, there is so great an increase in the percentage of polynuclear neutrophil cells, that it has risen above 79, then the probability of pus approaches a certainty.

It is scarcely necessary to state that, not only must pneumonia be excluded, but also the surface of the body must be carefully examined, because an abscess anywhere, even when small and superficial, may give rise to the same blood picture, as when it is extensive and deep.

There are three more observations to be carried out, all of which may be accomplished in less than ten minutes, and any one of which by itself is of but little importance, nevertheless, in conjunction with the others, is of great value.

When pus is present, the white cells often contain granules, which turn reddish-brown, when treated with iodine. The method of carrying out the iodophilic reaction is by painting a blood film with a mucilage of gum, containing one per cent. iodine and three per cent. potassium iodide, and examining it ten minutes later. A large number of white cells must be observed, because it is not infrequent, that only a small percentage gives the reaction.

Although this result may be obtained in cases of whooping cough, pneumonia, and several other diseases, nevertheless, when they can be excluded, it forms a valuable confirmatory sign of pus.

The absence of it should not, in my opinion, be considered as indicating absence of pus.

Inflammatory conditions are often accompanied by an increase in blood platelets, and in the amount of fibrin in the blood. These two bodies permit of the differentiation between pus and malignant disease. In the latter condition there is no increase in platelets and fibrin, whilst there may be a leucocytosis.

To sum up, the blood picture, in cases suffering from abscess, which does not possess a very thick wall, and which is due to some micro-organism other than tubercle bacillus, or amoeba of dysentery, is:—

Increase in number of white cells in the blood.

Increase in percentage of polynuclear neutrophil cells.

Iodophilic reaction of white cells.

Increase in the number of blood platelets.

Increase in amount of fibrin in the blood.

DIGESTIVE LEUCOCYTOSIS.

Von Limbeck found that the number of leucocytes in the blood increased after the ingestion of food, the maximum being reached in about 3 hours. Ten years later, von Japha showed that there was a daily tide, high tide being registered about 2 o'clock in the afternoon; this rise was independent of food.

Neither of these leucocytoses is very marked, the increase rarely being more than 3,000 per cubic millimetre from either cause. Through ignoring von Japha's observation, many experiments on digestive leucocytosis have been rendered valueless.

Vastenbergh and Breton have shown that, two hours after a meal, a digestive mononuclear leucocytosis occurs. In many cases, this is greater than the diurnal variation, which is of a polynuclear type.

Goodall and Paton have shown that in dogs the digestive leucocytosis is of the mononuclear type, and have proved that the source of the cells is the marrow and the marrow alone.

This digestive leucocytosis, if it occurs at all, becomes slight, being less than 1,000 per cubic millimetre in diseases of the stomach, that prevent active digestion.

It is asserted that, in the majority of cases suffering from carcinoma of the stomach, digestive leucocytosis fails, which is undoubtedly true, when advanced cases alone are under consideration. It is, however, of vital importance in this disease to make the diagnosis early, and before a tumour becomes palpable. At this stage, the absence of digestive leucocytosis is of but little value, since many other conditions may be responsible. In the reverse condition, however, where a tumour of the stomach is felt, which may be of inflammatory origin, a well-marked digestive leucocytosis would permit of a favourable prognosis being given, for the probability of the swelling being due to something other than malignant disease would be great.

The presence or absence of digestive leucocytosis in doubtful cases should be observed, although the conclusion, drawn from it, must be considered of minor importance, when compared with the results of other methods of investigation.

CHOLINE IN THE BLOOD.

The presence of a recognisable quantity of choline in the blood of patients, in whom active degeneration of nervous tissue was taking place, was first demonstrated by Halliburton and Mott; and it was suggested by them that the absence or presence of this substance might assist in the differential diagnosis between functional and organic disease. There is not the slightest doubt that, occasionally, even the most expert find it impossible to distinguish definitely between these conditions, and the difficulty is met by the assertion that organic disease is often accompanied by hysterical symptoms.

Experiments have proved that a recognisable quantity of choline in the blood only occurs when nerve degeneration is actively taking place, and, therefore, it would only be a waste of time to search for it, when a disease had reached a quiescent stage.

There are two main methods of recognising this substance in the blood, one depending upon the form of the double salt of choline and platinum, and the other on a colour reaction, with an alcoholic solution of iodine.

Halliburton's method consists in the treatment of 10 c.c. of blood with four times the volume of alcohol, filtration, and the evaporation of the filtrate at 40° C. The residue is taken up in

water-free alcohol, filtered in a dry chamber, or centrifugalised in a well-corked tube, and the clear fluid again evaporated. This process is performed four times, every precaution being taken to prevent the access of water to the absolute alcohol, or alcoholic solutions.

The final residue is dissolved in one cubic centimetre of absolute alcohol, and an excess of an alcoholic solution of platinum chloride is added. The precipitate, which is formed upon this mixture standing for a few hours, is washed with absolute alcohol, in order to free it entirely from platinum chloride, and then dissolved, either in a 15 per cent. solution of alcohol in distilled water, or in hot distilled water, and allowed to crystallise.

The crystals from the weak alcoholic solution appear as yellow octahedra, whilst those from water are roughly hewn, lance-shaped crystals, with jagged edges, often joined together in the form of crosses.

It is necessary to be careful to exclude all water contamination of alcohol, if this method is adopted, because ammonium and potassium salts are almost insoluble in water-free alcohol, but not in alcohol, diluted with one per cent. of water. Potassium and ammonium platinum double salts simulate, in many respects, the choline double salt.

The other method is performed, according to Allen, in the following way :—

Fifteen cubic centimetres of blood are mixed with five times the volume of absolute alcohol, allowed to stand for two hours, filtered, and the filtrate evaporated to dryness at 40° C. The residue is extracted with 3 c.c. of water-free absolute alcohol, filtered, and the filtrate again evaporated to dryness. A third extraction is made with 1·5 c.c., and the filtrate evaporated to dryness. The residue is then dissolved in ·8 c.c. of distilled water, transferred to a small dialyser, and dialysed into 4 c.c. of water for 24 hours. The resultant clear aqueous solution is then evaporated to dryness in a small porcelain capsule; to the residue one drop of distilled water is added, and shaken round in the capsule. An approximately saturated solution of iodine in 30 per cent. alcohol is then carefully added, drop by drop; the addition of 5 to 10 drops of the iodine solution results in the production of a reddish-brown precipitate, or

coloration, if choline be present, which, however, quickly disappears on standing, or on the addition of excess of the test solution.

These two methods give identical results when the necessary precautions, mentioned above, are taken.

Choline has been found in the blood of cases suffering from dementia paretica, cerebral syphilis, transverse myelitis, muscular atrophy, disseminated sclerosis, traumatic lesions of nerves. It is, however, in the differential diagnosis of disseminated sclerosis and hysteria that the method will be found of the greatest practical use.

THE TREATMENT OF LEUKÆMIA.

During the last three years, leukæmia has been treated with the application of the X-rays to the ends of the long bones, and to the region of the spleen. The treatment seems to have been empirical, but since it was apparently successful in some number of cases, Helber and Linser investigated the effect of X-rays upon the blood of healthy animals. These observers found that, after exposing rats to the rays for from 5 to 10 hours, the leucocytes in their blood were destroyed, so that the blood was quite free from white cells.

The effect upon rabbits was slower, the number falling to 1,500 after 70 hours' exposure: the larger the animal, the slower the effects. It was suggested, that the rays might drive the cells from the blood-stream into the tissues; this was shown not to be the case, upon examination of the tissues microscopically, and, therefore, the conclusion that the X-rays destroy the leucocytes was definitely established. Of the leucocytes, the lymphocytes suffer most, the rays apparently possessing a selective destructive effect upon them. The red cells, hæmoglobin, and blood-platelets suffer to an almost insignificant degree.

Heinecke had shown, about a year before, that the X-rays had a specific destructive influence upon the spleen-pulp, and upon the lymphocytes in its follicles. The treatment of leukæmia has usually been by the application of the rays over the splenic tumour and the lower epiphyses of the femora; occasionally to the sternum and vertebræ. Ten to twenty

minutes, on alternate days, are, as a rule, borne without any bad effects, save, at the worst, a little prickling, and a slight erythema.

The results are often striking, and the improvement, shortly after the beginning of the treatment, most striking; the rise in hæmoglobin being rapid, and the diminution in white cells most satisfactory. This latter phenomenon is apparently magnified, owing to the fact that the application of the rays causes at first a temporary increase in the number of leucocytes in the blood, and then a diminution. This temporary increase becomes of shorter and shorter duration, and finally disappears, if treatment is continued.

The white cell count, conducted just after exposure to the rays, will result at the beginning of treatment in an estimate higher than the average throughout the day, and in one below the average after treatment has been applied for some time. Along with the diminution of the number of white cells in the blood, and an increase in the number of red cells and the quantity of hæmoglobin, there is often a steady diminution in the size of the spleen, this is said to be less in chronic than in recent cases.

Even those cases, in which the blood becomes practically normal, are liable to relapse, and none, so far, have continued well for a sufficiently long time to be pronounced as cured.

Dock concludes that no stronger claim can be made for this treatment than for arsenic. In all probability the cases which are not benefited, are not recorded; I have seen two which failed to improve under X-ray treatment, and which reacted well to arsenic.



THE TREATMENT OF SCARS AND CHELOID.¹

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SCARS and cheloid growths do not disturb the health, or threaten life, but they are always a source of annoyance and often of serious inconvenience. They may produce such disfigurement as to make the patient practically an outcast from society. Even among the well-to-do, this may entail the loss of nearly all that makes life worth living; but, for those who have to earn their livelihood, an unsightly scar may mean starvation or the workhouse. Moreover, cheloid, in addition to disfigurement, sometimes causes great pain. The conditions, therefore, urgently call for whatever relief can be given by medical art. Too often, unfortunately, that is not much. So intractable indeed are scars, and particularly cheloid, that they are generally regarded as the mere despair of surgery, and it is even taught that when the lesions are of any considerable extent, active intervention is not only useless, but may do more harm than good. The experience of the last few years has convinced me that this pessimistic attitude, however justifiable it may formerly have been, is no longer warranted. With the therapeutic resources which the advance of science has placed in our hands, very decided improvement, and not seldom even complete cure, can be effected even in cases of severe and extensive scarring. This may strike you as a bold statement, but I do not ask you to accept it on my authority. My purpose in this lecture is to place before you facts which prove its truth, and to exhibit cases that will enable you to see for yourselves what can be done for the removal of disfigurement which a very few years ago would, with reason, have been looked upon as beyond the reach of any treatment that could be applied.

I do not propose to describe in detail the clinical appearances of scars and cheloid, or to discuss the pathology of the latter condition, of which indeed little is known. A rapid survey of the leading points may, however, serve as an introduction to the discussion of the question of treatment.

¹ Lecture delivered at the Medical Graduates College and Polyclinic, London.

The clinical characters of scars are familiar to all. I need only mention the *atrophic*, or *depressed*, scar, left by small-pox, chicken-pox, and acne, and the *hypertrophic* scar, which forms a band, or an irregular wen-like projection of greater or less size. Clinically, there is a fundamental difference between hypertrophic scars, however far they stand out beyond the level of the surrounding skin, and cheloid. The scar never extends beyond the limits of the area of destroyed tissue which it replaces; on the contrary, its tendency is to shrink, dragging the healthy integument towards it in the process. No scarring is left after eczema and other affections in which desquamation is a feature. When the process extends into the corium, as in lupus vulgaris and the later manifestations of syphilis, the disease always leaves its mark in the form of scars, varying in thickness according to the depth to which the original tissue has been destroyed. In structure a scar is simply connective tissue, arranged in interlacing bundles, without glands or hair follicles, and after a time often without blood vessels. Cicatricial tissue is mostly very tough, and, besides the deformities produced by contraction a scar may cause pain by compression of nerves, and, in certain situations, immobility by fixation of joints. Ordinary scars, except in cases where the lesion has been very superficial, do not disappear, although, in course of time, they often become less conspicuous. In hypertrophic scars, however, the tendency is sometimes to increase of thickening, and this may develop into epithelioma.

Unlike the ordinary scar, cheloid is a new growth. It used to be divided into two main forms—cicatricial or false, and spontaneous or true—according as it originated on the site of a previous lesion or, like Topsy, simply “grewed.” Now the weight of opinion is against this division, and it has come to be pretty generally held that the starting point of cheloid formation is always a lesion or injury. This may be of the most trivial kind, such as a scratch, a pin-prick, or an insect bite. The preferential seat of the so-called idiopathic cheloid is the fore part of the chest, and it is at least a suggestive coincidence that the same region is very frequently the seat of seborrhœic eczema, a condition which leads to a good deal of scratching. Cheloid is also met with on other parts of the trunk, and less frequently on the face, the ears (where it attacks the places

pierced for rings), and the extremities. In some cases there are multiple growths, and in such cases there may be a rough kind of symmetry in their arrangement. Cheloid presents great variation in shape and size. Generally it stands sharply out from the healthy skin, forming a flat, or horn-like, excrescence, and often anchored, as it were, into the neighbouring skin by claw-like processes, whence its name (*χελή*, a claw). Its surface is hard, smooth, and glistening; its colour, pearly-white or pink, sometimes purplish, according to the degree of vascularity. It is often tender, and may become the seat of troublesome itching, and even severe pain.

Histologically, cheloid is a connective tissue new growth, intermediate in character, as Crocker says, between a scar and a sarcoma, having its root in the corium, in which it is more or less deeply imbedded. According to Goldmann, who has had opportunities of studying the growth in different phases of its development,¹ the distinctive feature of cheloid is the formation of a tough layer of connective tissue made up of dense collagenous bundles. It should be noted that there is a transitory growth, which, as pointed out by Unna, develops on the base of infective granulomata, such as lupus and syphilis, and other infective inflammations, such as acne. This form is distinguished from the persistent kind chiefly by the fact that the liability of the vascular adventitia to fibromatosis is only transient. Such cheloids never reach the final stage of collagenous hypertrophy, from which there is no natural recovery.

The persistent growth occupies the whole depth of the reticulate layer within the first year of the formation; later it penetrates deeper, owing to increase of the papillary layer. At first there are no elastic fibres, but at a very early stage in the development of the growth, regeneration of these takes place in the papillary layer, which proliferates over the growth. This regeneration proceeds till, in the second year, the cheloid is enclosed in a capsule composed of loose connective tissue, permeated by a thick network of extremely fine elastic fibres. The growth becomes less vascular as time goes on, but, on the other hand, there is a more abundant development of vessels in the papillary layer investing the cheloid, and this increase continues till the evolution of the cheloid comes to a stop.

¹ Bruns's *Beiträge z. klin. Chir.*, 1901, Bd. XXXI.

That cheloid may be the result of a locally infective process is suggested by the fact that it extends its boundaries by invasion of neighbouring skin. This view was put forward some years ago by Marie.¹ A case, which seems to lend some support to this view, has been recorded by Legrain.²

An Arab, aged 20, suffered from a tuberculous affection of the shoulder. There were six sinuses running down to the joint; on the site of each of these cheloid developed. One of the growths was excised, but seven weeks later recurrence took place. No bacilli were found in the growth. Nevertheless, a young rabbit, into which a piece of it was inoculated under the skin of the belly, died 68 days after the operation. A small tubercle was found at the point of inoculation, and the spleen was found after death to be granular. Legrain suggests that cheloid may be of kindred nature to the fibroid growths found in the lungs in phthisis. However this may be, it is pretty generally believed that cheloid has a special association with tuberculous disease. On the other hand, it is the experience of Mr. Jonathan Hutchinson that common cicatricial cheloid very seldom develops on the scar of cured lupus. The few examples of this occurrence, which he has seen, have all been in cases where the cure was unusually complete. He thinks scraping is more likely to be followed by cheloid than any other method of treatment.³

A sidelight is perhaps thrown on this statement by Mr. Watson Cheyne's observation, that the supervention of cheloid is often noticed in wounds which have been subjected to an undue amount of irritation.⁴ Mr. Cheyne says that cheloid seems to be dependent on some constitutional state. This, I take it, is equivalent to a confession that we know nothing as to its origin. I am myself inclined to believe that an infective element of some kind plays some part in the pathogenesis.

Cheloid of the persistent form occasionally undergoes some degree of involution, and may even disappear spontaneously. This occurrence is, however, so rare that it cannot be taken into account in considering the expediency of treatment. In the majority of cases the tumour, after increasing slowly in

¹ *Bull. et Mém. de la Soc. Méd. des Hép.*, 1893, t. X.

² *Compt. Rend. de la Soc. de Biologie*, 1893, t. V.

³ *Arch. of Surgery*, Vol. IV., 1893.

⁴ Art. on "Diseases of Cicatrices" in Treves's *Surgery*

size, perhaps for a period of years, becomes stationary. Mr. Hutchinson's statement that "the common cases in which in children the scars of burns are attacked, almost invariably get well, and their duration is, in many cases, only short," must be taken to refer to cheloid of the transitory type. This interpretation seems to be confirmed by the further statement made by the same great authority, that, when cheloid has begun in a very small scar, and has spread widely at the expense of sound skin, it may possibly last out the patient's life. For practical purposes, cheloid must be regarded as having an inherent tendency to persist. This brings us to the question of treatment.

TREATMENT.

The first thing to be decided when one is confronted with a case of scarring cheloid is, whether treatment of any kind is necessary or advisable. And, before going any further, I wish to point out that it does not fall within the province of the dermatologist to deal with scars of very large extent, such as follow severe and extensive burns. Such cases belong to the domain of surgery. I am concerned here only with the comparatively small scars resulting from small-pox, chicken-pox, acne, lupus vulgaris, and lupus erythematosus. In all these cases there is loss of tissue, with consequent depression. Scars of this kind, in regions that are usually hidden from sight, are best left alone, if they are not painful. But, when they are situated on the face, the patient is naturally anxious to be treated for cosmetic reasons. Cheloid is sometimes so painful that treatment may be called for even when the disfigurement is not visible. The principle underlying all methods, except those which are purely surgical, is to set up in the affected parts a reaction sufficiently strong to destroy the cicatricial tissue. In the case of deep pitting from small-pox or chicken-pox, and in severe scarring from acne, great improvement can be brought about by the persevering use of stimulating applications, such as sulphur or resorcin ointments. These, if applied continuously for a sufficient time, set up reactive inflammation of the skin, which is followed by peeling off the horny layer. As an example, I may mention the case of an American gentleman, who came to me for the removal of

small-pox scars. The disfigurement was so hideous that the poor fellow was the object of attention, wherever he went. A strong resorcin ointment was applied to the face, and kept on till reactive inflammation was set up. This was followed by peeling. The result was excellent. The thickened edges of the pits were levelled down, and the depressed bases were raised to the level of the surrounding skin. After the treatment, the man's face was quite presentable, and ceased to excite notice.

In cases of cheloid, Stelwagon¹ has found that frictions with ichthyol ointment (10—25 per cent.) retard growth and relieve itching; he has also obtained good results from the continuous application of a plaster-like ointment, composed of salicylic acid (10—20 grs.), lead plaster, and soap plaster āā 3 iii., with petroleum, to make up one ounce, or of the same ointment with the addition of 3 i.—iii. of ichthyol. According to Duhring, iodine and lead, and mercurial plasters, promote absorption. Marie² recommended injections of a solution of creosote in olive oil (20 per cent.), at a number of points in the growth; these cause inflammation and swelling, and finally sloughing, and in this way the tumour is removed piecemeal. This plan is an example of the curative effects of reaction. Cases in which it has been used with success, have been reported by Balzer and Mousseux, and by Péré. Injections of a 10 to 15 per cent. solution of thiosinamin in alcohol, or in equal parts of glycerine and water, have given excellent results in the hands of Tousey of New York, and others. On the other hand, G. T. Jackson has employed thiosinamin injections in several cases without any beneficial result.

Electrolysis has been used by Brocq and others with fair success. Crocker, who recommends the method, finds a surgical needle curved on the flat, and attached to the negative pole, best for the purpose; it is passed under the growth, and a current of three ampères is used for twenty to thirty seconds for each insertion. Stelwagon states that it frequently checks development, and sometimes reduces the size of the growth; it also relieves itching and pain. It may be well to warn you not to expect too much from electrolysis. Stelwagon, who is in

¹ *Treatise on Diseases of the Skin*, Philadelphia, 1902.

² *Bull. et Mém. de la Soc. Méd. des Hôp.*, 1893.

favour of it, confesses that it is "only occasionally more than moderately successful." L. Steiner,¹ of Leipzig, has obtained good results in a case of acne cheloid by the persistent use of a combination of electric light (arc) and a special sulphur ointment—thiolan—in which the sulphur is partly dissolved, and partly in a very fine state of emulsion. The ointment is first spread over the part to be treated, and the light is then applied. Steiner attributes the effect of this method to the fact that it induces a state of active hyperæmia with consequent absorption. In other words, the benefit is due to local reaction.

Another method of treating cheloid is pressure by means of an elastic bandage. This may be used in combination with frictions and the application of mercurial plasters. Destruction of the blood-vessels, by linear scarification, is said to have given good results in the hands of Vidal; he "minces" the growth by deep incisions made in all directions. The procedure may be followed by the application of boracic acid dressings. Excision is not, except for special reasons, to be recommended, recurrence being the rule after the operation. If it is done, the knife should be carried a considerable extent beyond the limits of the apparently unaffected skin, so as to remove the whole area of infection. Recurrence is not the only ill effect to be feared from excision; sometimes the process seems to be quickened into greater activity by the operation.

Internal medication has been tried in the treatment of cheloid, with doubtful success. J. William White² has recorded the case of a young girl with a linear cheloid which developed on the scar of a wound. After local treatment had been employed for three months, thyroid extract was given. In six weeks the scar, in almost its entire extent, had been reduced to the level of the surrounding skin, and the dense base had disappeared. White admits that the cheloid might have been on the point of undergoing spontaneous involution. Stelwagon has tried the plan in several cases; in one a large cheloid was materially diminished in size, but here again there is a doubt whether this was the result of treatment, or

¹ *Munch. med. Woch.*, April 18, 1905.

² *Philadelphia Med. Magazine*, 1894-95, VII.

of spontaneous involution. The prolonged administration of arsenic has also been recommended. I have no experience of internal medication, but I hold strongly to the belief that no good is to be done except by the production of local reaction. On the whole, the results of the methods that have been enumerated have not, on the admission of those who recommend them, been particularly brilliant. That they are occasionally successful, cannot be denied. I have myself entirely removed a small cheloid by scarification, followed by the application of substances which excited strong reaction. But, as a rule, they are, at best, palliative, while sometimes they are a little more than counsels of despair. Hence, not unnaturally, there is a tendency amongst practitioners to do nothing, lest worse befall. There are, undoubtedly, cases in which a policy of masterly inactivity is the right one. When the face is affected, extensive removal of scars or cheloids is out of the question. But for scars of moderate extent, and for bands of cheloid on the face, we have, in Finsen's light treatment, a method which I have found so satisfactory, that my principal object in addressing you is to recommend its use. I think it scarcely too much to say that this treatment enables us to grapple successfully with a difficulty, which our art has hitherto been unable to overcome. It is well known that the chief advantage of Finsen's method, in dealing with lupus and other affections of the skin, is that the application of light is not followed by scarring. This cosmetic effect is its distinctive feature. But not only does it leave no scar itself, but, in many cases, it removes the scars left by other procedures. This it does by setting up reaction, and causing absorption of the cicatricial tissue.

CASES.

As an example of the results that can be got by this method, I bring before you one or two cases.

I.—A. P. Here is a woman who has suffered many things from many physicians for the cure of extensive lupus of the face. As the result of the various methods of treatment that had been tried, there was great scarring with much disfigurement. Lastly, she was treated with light rays. The treatment was prolonged over a long period, and she had, in all, some

500 applications; and now, as you can see for yourselves, there is only a slight trace of the disease, and but little scar. The disfigurement has been completely removed, and since her cure the woman has got married.

II.—Miss E.—. Here is a case which strikingly illustrates the effect of light on extensive scars. Seven weeks before this lady came for treatment, she had been severely burned about the face and feet by sulphuric acid, upset from a cart in Lisbon. She was laid up for a fortnight after the accident. The burns left several scars, which became hypertrophic. There were two tense thick bands running across both inner canthi, a raised linear scar in the site of the right naso-labial fold, one or two small less thickened patches on the right side of the upper lip, and two in the left temporo-frontal region. The thickening was increasing, and the disfigurement was becoming worse. The light treatment was commenced on February 21, 1905, applications being made for one hour daily. The treatment was continued until July 31st. The patient had 41 applications altogether. The scars and hypertrophic processes were gradually softened and flattened, and when she returned after a time for inspection, the thickened processes had almost disappeared from the inner canthi, and the other scars were so much reduced, that practically all the disfigurement was removed.

The method is not less successful in removing scars left by tuberculous abscesses, as the following two cases will show:—

III.—Miss ——. This patient had an unsightly scar on the left side of her neck, extending from the middle line to the anterior border of the sterno-mastoid. The scar, which had an irregular surface, with several loose hanging pieces of scar tissue, was the result of tuberculous abscesses. After 20 applications, three times a week, from June 21 to July 24, 1905, the cicatricial tissue was softer, the surface of the scar flatter and smoother, and the projecting processes of fibrous tissue had become detached. The result was a great improvement in the appearance and texture of the cicatrix.

IV.—Miss C—— presented several scars, resulting from operations upon tuberculous glands on the right side of the neck and chin. In addition to the flat or depressed scars, there was a prominent band of hypertrophic cicatricial tissue on the

site of a line of incision at the anterior border of the right sterno-mastoid. The disfigurement was great. She was treated from November 7 to 15, 1904, from March 14 to 20, 1905, and from May 11 to 19, 1905. In all, 34 applications were made. The elevated parts were reduced in size and thickness, and became flush with the surface, while a deeply depressed scar was, to a certain extent, levelled up. All the scars became whiter and less conspicuous. To such a degree was the disfigurement removed that the lady was able to wear low dresses.

The Finsen light is also successful in the treatment of cheloid. The following is an example :—

V.—Miss — suffered from cheloid thickening of the edges of a skin graft on the nose applied after lupus had been excised for the second time. When first seen, there was a yellowish-white smooth patch on the right ala of the nose, corresponding to the graft, bordered by a well-defined, raised, and indurated edge of a pinkish colour. Treatment by X-rays considerably reduced the thickening, and the skin became more supple and natural in colour. After an interval of several months Finsen light was employed with the result that still further improvement ensued.

It should be pointed out that Finsen's method is not applicable to very extensive surfaces, as only a very small portion can be dealt with at a time. It is, therefore, not available for the treatment of small-pox pitting. In dealing with cheloid growths of any size, the X-rays are more effective. From a cosmetic point of view, however, this method is not so satisfactory, as it leaves the skin around more or less roughened, and the normal appearance is not quite restored. Moreover, the process is almost as tedious as in the Finsen method. Pancoast¹ recommends the use of X-rays, after excision, to prevent recurrence. Crocker's experience leads him to rely on the X-rays, combined with thiosinamin injections. The X-rays are also useful in dealing with hypertrophic scars.

In bringing these remarks to a close, I wish again to emphasise two points. One of these is, that the thing to be aimed at in the treatment of the conditions, which we have been considering, is the production of *local reaction*; this,

¹ *St. Louis Med. and Surg. Journ.*, No. 1, 1904.

with its consequences, destruction and absorption, is the mechanism by which a cure is brought about. But we must know, so to speak, how to measure, and also how to adapt, the dose to the particular case with which we are dealing. In this lies the secret of success.

The other point is, that, as I hope I have shown, a great deal can be done, even in cases that look almost hopeless, by the method which we owe to the persevering labours of Finsen. For scars of any manageable dimensions, it is far and away superior to any treatment that has hitherto been used.



THE PATHOLOGY OF DROPSY.

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(Concluded.)

II.—RENAL DROPSY.

THAT the pathology of renal dropsy is still very obscure is evidenced by the many theories which have been brought forward to account for the condition, and by the vague views still held concerning it. Nevertheless, a number of facts have of late been elucidated which justify a renewed criticism of these different theories.

In this paper, the dropsy occurring in the later stages of granular kidney (Bright's disease) will not be considered, since it is usually cardiac in origin; typical renal oedema, as it occurs in acute nephritis and in chronic parenchymatous nephritis, will alone be dealt with. Dropsy, when present in these diseases, presents two characteristic features. First, the fluid is not primarily observed in the most dependent parts of the body, though the influence of gravity becomes obvious as the amount of fluid is increased. Secondly, the oedema fluid is more dilute than that of cardiac dropsy, as regards its proteid, though not its saline constituents. It will be seen later that this feature is one of great significance.

The various theories held as to its causation may be grouped under three headings, namely:—

- (A) Changes in capillary permeability.
- (B) Changes in capillary pressure.
- (C) Changes in the tissues.

(A) *Increased Permeability of the Capillaries combined with Hydræmic Plethora.*—One of the earliest hypotheses concerning renal dropsy was that of Grainger Stewart and of Bartels, who considered that, in consequence of the scanty output of urine in nephritis, the blood became more watery, and was in a condition of hydræmic plethora, so that increased filtration through the capillaries took place.

The matter was obviously capable of experimental investigation, and Cohnheim and Lichtheim produced hydræmia and

hydræmic plethora in animals by the intravenous injection of saline solution.

They obtained œdematous swelling of the various secretory glands, and increased gastro-intestinal secretion, but no trace of subcutaneous œdema. But if hydræmic plethora was combined with local inflammation of a limb, or with local venous obstruction, dropsy occurred in the damaged area. Moreover, bleeding an animal on successive days, and replacing the blood by saline solution, interfered with the proper nutrition of the capillary endothelium, and increased its permeability; ligature of the femoral vein then induced œdema of the leg. Cohnheim concluded that in renal, as in cardiac dropsy several factors are concerned, and that no one factor accounts for its production. He held that, in nephritis, toxic bodies are formed which damage the capillary walls and increase their permeability; renal dropsy, therefore, is inflammatory in origin. The observations of Magnus also emphasise the existence of several factors in the production of dropsy. This observer repeated and confirmed Cohnheim's experiments. He then proceeded to poison animals with arsenic, which is known to damage especially the walls of the blood-vessels. After injecting small quantities of arsenic into dogs for some days, he induced hydræmic plethora, and obtained marked œdema of the subcutaneous tissues and of the pleural and peritoneal cavities. The same effect was obtained by setting up hydræmic plethora after nephrectomy; apparently it could be produced very shortly after the removal of the kidneys, or ligature of the ureters. Magnus holds that, in nephritis, there is injury to the vessel-walls by toxins causing increased permeability of the capillaries and increased filtration of lymph. This view is undoubtedly widely accepted in spite of certain very obvious difficulties. Taking them as a whole, the capillaries of the limbs and subcutaneous tissues are much less readily damaged by poisons or injurious agents than are those of the viscera, and yet ascites is by no means frequent in renal dropsy. The difficulty can only be overcome by assuming that the toxins formed in nephritis have a specially powerful action on the capillaries of the limbs and subcutaneous tissues, in distinction from most other poisons, which primarily attack the capillaries of the viscera. And there is no evidence in support of this assumption. Again, uræmia is undoubtedly a toxic condition, yet it

may occur in the complete absence of œdema ; and Cohnheim's conception involves the existence of two sets of toxic bodies, one causing uræmia, the other damaging the capillaries and producing dropsy.

Further, it is well known that increased permeability of the capillary wall renders the lymph, which filters through it, more concentrated. And, if renal dropsy depends mainly on the filtration of fluid through capillaries damaged by toxins, and thereby rendered more permeable, the œdema fluid ought to be rich in proteid. But as a matter of fact, the fluid in renal dropsy is always extremely dilute ; it contains much less proteid than the fluid of cardiac dropsy, in which increased permeability of the capillaries is known to exist. The following analyses of subcutaneous œdema fluid illustrate this point :—

—	Specific Gravity.	Total Solids.	Proteid.	Salts.
Cardiac Dropsy	1008	1.62 per cent.	0.33 per cent.	0.788 per cent
Renal Dropsy -	1007	1.18 " "	0.056 " "	0.874 " "

On the other hand, there is no doubt that, when the permeability of the limb capillaries is increased in inflammation, the lymph formed in the limb is more concentrated than usual ; the hypothetical existence in nephritis of toxins raising the permeability of the capillaries to water, but not to proteids seems, therefore, to be rather far-fetched. It is clear that the hypothesis, that renal dropsy depends on the damage to the capillaries by toxins, is open to serious objections, and is not in harmony with physiological knowledge of lymph formation.

As regards hydræmia and hydræmic plethora, again, Houston finds that in many cases of renal dropsy, the blood is not unusually watery, but may be practically normal in composition.

It may, therefore, be stated that, while it is possible experimentally to produce general subcutaneous œdema by producing hydræmic plethora in an animal whose capillaries have been rendered abnormally permeable, there is but little evidence that these factors play an important part in the production of renal dropsy as observed clinically.

(B) *Increased Capillary Pressure.*—On the other hand, a totally different view has been put forward by other writers, of

whom Dickinson is the most prominent. Dr. Dickinson points out, first, that the characters of the œdema fluid are not those of an inflammatory transudate, and, secondly, that the mere retention of urine is not an efficient cause of dropsy. He calls attention, however, to the existence of high arterial tension in the early stages of nephritis associated with dropsy; in very acute cases, on the contrary, the arterial tension is low and œdema is often absent. He considers that, at this stage of the disease, toxins are present in the blood, which increase the resistance to the flow of blood through the capillaries, and thereby raise the capillary pressure; the rise of pressure causes an increased transudation of fluid.

Subsequently, as the heart hypertrophies, and the arterial pressure rises still further, the œdema often disappears. At this stage, the arterial pressure depends, not on the resistance of the capillaries, but on constriction of the arterioles, which protect the capillaries; as a result, the capillary pressure falls to normal, and the œdema disappears. In obstructive suppression of urine, dropsy does not occur, because the arterial pressure, and therefore the capillary pressure, is low. There seems, however, to be but little direct evidence either of the existence of such toxins, or of the actual occurrence of increased capillary resistance. And it is difficult to imagine that a poison could so alter the capillary wall as to increase the resistance to the flow of blood without, at the same time, increasing its permeability. In inflammation, for example, both these processes certainly take place.

The impossibility of producing renal dropsy in animals is a very serious drawback to the experimental investigation of this theory. It seems clear, however, that the failure to secrete urine is not a sufficient cause of dropsy; ligature of both ureters, or double nephrectomy, never causes renal dropsy in animals. None the less, there is no doubt that deficient secretion of urine is one factor in renal dropsy. It is usually the case that the amount of dropsy and the flow of urine vary inversely, and that an improved urinary secretion is accompanied by lessened œdema; on the other hand, œdema may be associated with an almost normal output of urea and nitrogen. The only experimental work in which interference with the kidneys led to œdema is that of Boyd. He repeated the observations of Ribbert, who excised the whole of one

kidney and the medulla of the other, leaving the animal with only the cortex of one kidney. He found in one or two of his experiments, that cutaneous oedema and ascites were present, particularly when the flow of urine was scanty.

(c) *The Influence of the Tissues.*—The views of those writers who believe that changes in the tissues are responsible for renal dropsy, may now be considered. The work of Hamburger and of Lazarus-Barlow may first be dealt with, since their conclusions were put forward before the experiments of Asher were carried out.

Hamburger holds that dropsy is due, partly to increased permeability of the capillary wall, partly to secretion of fluid by the capillary endothelium; the stimulus to secretion is provided by certain substances formed in disease. For instance, he found that ascitic fluid from a patient suffering from nephritis, when injected into a dog, increased the lymph flow from the thoracic duct, whereas ascitic fluid from a patient with normal kidneys had no such effect. He brings forward other evidence of a similar character.

Lazarus-Barlow considers that the production of dropsy, whether cardiac or renal, depends on the tissues, not upon the blood-vessels. He believes that the essential cause of dropsy is the retention of waste-products of metabolism in the tissues and tissue-spaces. The importance of tissue-changes is illustrated by the following experiment. One limb of an animal is tetanised for some time, and then hydraemic plethora is produced; the tetanised limb becomes oedematous, the other does not. Barlow further considers that the tissues obtain their supply of lymph from the blood by a vital process, although it is not clear how they make known their needs.

The important part played by the tissues in relation to dropsy, first indicated by Barlow, has been very clearly manifested by more recent investigations, which have further rendered possible a more definitely physical explanation of the observed facts. As previously stated, the work of Asher and others has conclusively demonstrated that increased tissue-activity increases the formation of lymph. I believe that, when metabolism is taking place in an organ, large molecules are broken down in the tissues into smaller ones, which raise the osmotic pressure of the cells and tissue-spaces. In consequence of this rise of osmotic pressure, water passes from

the blood-vessels into the tissue-spaces, and increases the flow of lymph from that organ. Such an explanation of the facts is purely physical, in contradistinction to the more or less vitalistic views of Lazarus-Barlow or Asher.

That metabolic changes in an organ do increase the intake of water into the tissue-cells and spaces by osmosis is very clearly demonstrated by the experiments of Morley Fletcher. He took the gastrocnemii of a frog and tetanised one of them. Both muscles were then weighed, and placed in isotonic or hypotonic saline solution. After a time, they were removed from the salt solution and again weighed. The tetanised muscle invariably took up more water than the resting one, and was often visibly swollen and bloated. There can be no doubt that the muscular contraction had raised the osmotic pressure of the tetanised muscle by setting free metabolites of small molecular weight; consequently the active muscle took up more water.

The occurrence of a similar process in the muscular system, as a whole, would lead to the accumulation of fluid in the muscle-fibres, and the lymph-spaces surrounding them. If the lymph-channels were unable to cope with and remove this fluid, the excess would eventually show itself in the distensible subcutaneous tissues, and appear as dropsy. And there is strong evidence that interference with the kidneys does increase the metabolism—particularly the nitrogenous metabolism—of muscle. Rose Bradford has shown that, after the removal of one kidney, and more than half of the other one, the secretion of urine becomes excessive, and the daily output of nitrogen, chiefly as urea, is also much greater than in the normal animal. There is also extreme muscular wasting. He suggests that the kidneys normally control muscular metabolism, which runs riot in the absence of sufficient kidney substance. Many observers consider that in nephritis the internal secretion of the kidneys, or, at least, their control of nitrogenous muscular metabolism, is deficient. There is, certainly, as von Noorden has shown, a great increase of nitrogenous extractives in the blood, tissues, and oedema-fluid of nephritic patients, even when the output of urine and urea is practically normal.

There is, therefore, a considerable amount of evidence that in nephritis with dropsy, excessive katabolism of the muscles is taking place; if this is true, it follows inevitably that an

excess of lymph is being formed in the muscles all over the body. Although this hypothesis is not yet fully proved, it certainly accounts for most of the features of renal dropsy, namely, the distribution and composition of the dropsical fluid, and the absence of œdema in obstructive suppression of urine. First, a general increase of muscular metabolism throughout the body implies an increased formation of lymph everywhere ; as soon as the amount of lymph formed is too great to be carried off by the lymphatics, it will appear, wherever the subcutaneous tissues are loose, and show most readily the presence of small quantities of fluid. This is the course of events in renal dropsy, though as the amount of fluid increases, the influence of gravity makes itself increasingly felt. Secondly, the lymph formed by tissue metabolism is more dilute than normal lymph ; the dropsical fluid of renal disease is also very dilute. Thirdly, the difficult question of the absence of œdema in obstructive suppression of urine receives a possible answer. It may be presumed that, until the onset of the final obstruction, the kidneys still exercise their control over the muscles. The obstruction to the flow of urine does not necessarily interfere with the internal secretion of the kidney ; the muscular metabolism, therefore, remains unaffected, and, as one of the factors present in nephritis is absent, no dropsy occurs. The importance of tissue-metabolism, and especially of muscular metabolism, as a factor in renal dropsy, has hitherto been very imperfectly recognised, and, for that reason, considerable emphasis has been laid upon it here.

The influence of the ingestion of sodium chloride on the production of renal dropsy opens out a new aspect of the subject. Two French physicians—Widal and Lemièrè—gave large doses of common salt to patients suffering from various forms of nephritis. Of three cases of parenchymatous nephritis, two became markedly œdematous. Four cases of interstitial nephritis, similarly treated, remained free from dropsy. Investigation of the urine showed that, when the sodium chloride taken by the mouth was entirely excreted in the urine, œdema did not occur, whereas the retention in the body of a considerable portion of the ingested salt was followed by dropsy. These observations have been repeated and modified by many observers with much the same results. The outcome of these investigations is that, in some forms of nephritis, the excretion

of sodium chloride by the kidneys is defective, and, if the intake of salt is excessive, much of it is retained in the body.

So far as is known, the blood and tissues are invariably isotonic, with (approximately) 0.9 per cent. sodium chloride. Any deviations from this level of "tonicity" are merely transient, and are rapidly rectified. The retention of chlorides in nephritis will tend to make the blood and tissues hypertonic to their normal level, and, in order to obviate this tendency, water is also retained in the body until the blood and tissues are again isotonic. And it can readily be understood that, in a patient on the verge of oedema, such a retention of water may be sufficient to turn the scale, and to render him obviously oedematous. It may be further pointed out that this factor will act everywhere in the body, so that the first onset of the oedema will not be obviously influenced by gravity. These observations open up a new field for research with regard to other substances excreted by the kidneys. They also indicate the possibility that, in nephritis, a scanty secretion of urine depends primarily on inability of the kidney to excrete its solid constituents rather than upon a deficient filtration of water.

In conclusion, it is clear that the causation of renal dropsy is still very obscure; but the factors concerned in its production may be summed up as follows:—

(1) A scanty output of urine, as indicated by the observations of Dickinson, and by the fact that, in chronic nephritis, the onset of cardiac hypertrophy and increased urinary flow are often accompanied by diminution of the dropsy.

(2) The retention in the body of sodium chloride, and possibly other salts, owing to deficient excretory power on the part of the kidney; as a result of osmotic changes, retention of salts necessitates the retention of water as well.

(3) Increased katabolism in the muscles in consequence of a partial or complete loss of control over muscular metabolism by the kidneys; this excessive katabolism brings about the accumulation in the muscles and tissue-spaces of waste-products (metabolites). These metabolites by a process of osmosis, attract water from the blood into the tissue-spaces; when the amount of fluid in the tissue-spaces cannot be carried off by the lymph-channels, oedema makes its appearance.

It may be further concluded that, as a rule, none of these

factors is in itself a sufficient cause of dropsy, but that at least two of them are always involved. Nevertheless, Bryant has recently recorded a case of œdema, brought on—in an otherwise healthy man—by the excessive eating of salt.

Dropsy in Anæmia.—In severe anæmia, dropsy, to a moderate degree, is by no means uncommon. It appears to depend upon vascular rather than tissue changes, and to be the result of two factors.

First, the oxygen-carrying power of the blood is low; the nutrition of the capillary endothelium suffers, and its permeability is therefore increased.

Secondly, the work of Haldane and Lorrain Smith points to the conclusion that, in chlorosis, the volume of the blood is much increased, and that a condition of hydræmic plethora is present. The venous, and therefore the capillary, pressure will be raised, and an increased filtration of lymph will occur. In other forms of anæmia, no hydræmic plethora exists, and the œdema must be largely the result of increased permeability of the capillaries.

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REMARKS ON RENAL TRAUMATISM.¹

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THE considerable increase in recent years of renal traumatism is merely due to the greater number of accidents resulting from the development of modern industry. Then again, during the last decade renal surgery has greatly advanced, and, from our more precise knowledge, this branch of surgery is becoming prominent. In 1902 Maas and Kuster collected and published 306 cases of rupture of the kidney, while, in his recent work, Delbet has recorded 320 cases of contusion of the kidney. Schmidt has reported 57 cases of subcutaneous injury to the kidney, 55 of which occurred in the German army. Many other surgeons have recorded their experience, so that, at the thirty-second German Surgical Congress, Riese was able to tabulate 491 cases. Since this paper was written other observations have been published by Bechtold, Wolf, and Cahen. However, on account of the protected situation of the kidneys, traumatism still forms a comparatively small percentage of renal disease, and, as each case is more or less different in its clinical aspects, it seems only proper to record them as they come under observation.

In going over the records it will be at once seen that the male sex represents by far the largest proportion of renal traumatism, and Kuster found in his statistics that it was as high as 94 per cent. The causes of subcutaneous traumatism of the kidney are probably, in most cases, due to the direct influence of some blunt contending body, either directly applied over the renal region, or at some distance from it. Simple muscular action resulting from extreme tension, for example, may, by a strong reflex movement to prevent falling, &c., occasionally give rise to trauma of the kidney. However, blows, squeezing between carriages, and the like, and run-over accidents are the

¹ Presented at meeting of the Urological Association of France, Paris.

most common factors of renal traumatisms. Falling from some height may also give rise to renal trauma, if the patient should strike against a hard object during the fall.

That a kidney may be injured in certain circumstances by a relatively slight accident, can be easily understood if the more minute processes taking place are taken into consideration. By animal experimentation, as well as on the cadaver, it has been shown that the mechanism of the development of rupture of the kidney depends principally upon a sudden jerking adduction of the lower limbs, pressing the kidney against the spinal column, or by hydraulic pressure acting upon a distended renal pelvis, or an extremely vascular renal parenchyma. In order to produce rupture of the renal pelvis or parenchyma, the ribs must press perpendicularly upon the gland, but if the latter should be present, a tangential action, a laceration or loosening of the renal attachments results, generally separation of the renal vessels or the ureter, and separation of the lower pole of the kidney has been known to occur.

It is quite permissible to assume that old or still existing inflammatory and degenerative processes seated in the renal parenchyma, may be a predisposing cause for laceration or injury to the kidney should a traumatism occur. According to the nature of the accident, the hilus may be ruptured, resulting in retroperitoneal hæmorrhage, &c., whereas in direct contusion, irregular ruptures result on the anterior aspect of the organ, and quite frequently the peritoneal covering participates, and then a hæmorrhage into the peritoneal cavity will result. Corresponding to the variety and force of the traumatism, the symptoms of laceration of the kidney also vary greatly, but in the majority of cases the diagnosis may be made, with a fair amount of certainty, by certain symptoms which are very prone to be present. It should, however, be recalled to mind that one must always take into consideration the possibility of injuries arising in other viscera at the same time, which may considerably influence the clinical picture.

Subcutaneous traumatism of the kidney gives evidence of general manifestations particularly referable to the central nervous system, and then come the local symptoms arising directly from the renal injury. The general symptoms consist

in apathy immediately after the accident, followed or not by unconsciousness, and, in certain circumstances, syncope of several days' duration may supervene. Vomiting, a small and frequent pulse, and subnormal temperature are also symptomatic, and, in most cases, an extreme pallor of the integuments is noticeable, which may result from shock, or may suggest the possibility of internal hæmorrhage. In those cases which have come under my personal observation, this very marked anæmia was certainly the most important general symptom. The persistency of unconsciousness resulting from the traumatism was met with immediately after the accident in one case. In one instance the most prominent symptom was that of shock. He was apathetic, hardly answering any questions, while the pulse could hardly be felt and the pupils were dilated. The vomiting which occurred at first, I think, is to be considered as the immediate result of the accident, but that arising on the following day may be considered as symptomatic of the injury to the kidney.

The patient, a 31 year old labourer, was seen with his family physician four hours after he had been run over by a heavy team. He was fairly well nourished. Marked anæmia of the integuments and mucous membranes; the skin of the limbs covered with cold perspiration. Patient is conscious, but very apathetic. Pulse can hardly be counted. Pupils dilated and react to light. Abdomen extremely tense, so that nothing can be elicited by palpation; no dulness on percussion. Catheterization removed 350 cc. of bloody urine containing some coagula. The bladder was irrigated, but the fluid returned uncoloured, and measuring the amount of fluid introduced showed that the entire quantity was returned. A large saline enema improved the pulse. In the evening the patient vomited. Temperature normal. The night was poor, but in the morning the temperature was still normal, and the pulse 120, although still very weak. The abdomen was not as tense as the day before, and a slight diminution of the percussion sound was found, although there was no dulness to the left below. The liver dulness normal. In the left renal region bogginess could be detected, and it was very sensitive on pressure, although there were no external marks of violence. On the whole, the general condition was better

and the patient less apathetic, but he complained of considerable pain in the left renal region. During the morning he again vomited, and on passing the catheter 500 cc. of urine were withdrawn containing traces of old blood, and the amount of albumen present could be easily accounted for by the blood. Cold was applied locally to the kidney, and the patient kept on a milk diet. On the fifth day following the accident the abdomen was normal, and no dulness could be elicited. The urine was passed spontaneously, and only contained a very slight trace of albumen. At the end of the week the general condition was perfect, the pulse had regained its strength, and the albumen had disappeared from the urine, which, microscopically, was normal.

The general symptoms, however, cannot be relied upon as of absolute diagnostic value for kidney contusion, nor for estimating the gravity of a given case, because they may arise in any accident, particularly in contusion of the abdomen, and frequently do not correspond in any way with the real gravity of the accident.

The local symptoms arising in the injured kidney are much more constant, and will allow one to discover the seat of injury with a fair amount of certainty. The main symptoms, which are practically always present in laceration of the kidney, are severe local pain in the region of the injured organ accompanied by a tumefaction of the renal region, which is usually dull on percussion, and the presence of blood in the urine. The pain complained of in the region of the injured kidney is severe, and frequently of a colicky nature similar to that met with in the passage of a renal calculus. The pain is spontaneous, but is increased on pressure over the parts, sometimes by the slightest movement on the part of the patient. This may be accounted for by the tense condition of the abdominal muscles, probably of a reflex nature, as well as a suppression of deep respiration by which the diaphragm and thorax obtain as much rest as possible, thus protecting the injured kidney from further pressure. Practically certain evidence of contusion and the seat of a perirenal hæmorrhage or urinary collection, is given by the tumefaction in the region of the kidney affected, as well as by the percussion

dulness found over the tumefaction. The integuments over the injured kidney will usually show a bruised condition, but these external signs may be entirely absent. If the contusion results in a laceration of the renal parenchyma, severe hæmorrhage and escape of urine into the capsule of the organ are apt to follow, and should the capsule be torn or the renal pelvis lacerated, the fluid may extend to the retro-peritoneal cavity, or even into the peritoneal cavity. When this occurs, there is usually abdominal distension, which, however, may also occur when there is slight intestinal contusion, while, when there is a retro-peritoneal collection, the peritoneum will be pushed forward, and the former will reach the integuments of the lumbar region, producing tumefaction, while as soon as the pain diminishes and the abdominal walls become relaxed, palpation will reveal a tumour, which will be found dull on percussion.

In the following case which came under my observation, the thigh was flexed on the side of the injured kidney, which, I believe, is not a frequent occurrence, and it would appear evident that a tumour arising from the injured kidney, pressed upon the psoas muscle, and, like an abscess of this muscle, resulted in flexion of the thigh.

The patient, a lad 18, was accidentally run over by an automobile, the vehicle passing over the middle of his body. His physician saw him within an hour after the accident. He was then pale, the respiration rapid, and the pulse small and thready. There had been repeated vomiting. Abdomen somewhat distended and particularly painful over the right renal region. Temperature subnormal. A diagnosis of injury to the right kidney was made, and I was asked to see the case about 8 hours after the accident.

At this time the anæmia was very marked, the abdomen distended and everywhere tender. On passing a catheter about 500 cc. of bloody urine was obtained. There was dulness over the right renal region and a distinct resistance was thought to be felt, although this could not positively be made out on account of the abdominal distension. There was considerable tenderness over the right renal region, and the dulness elicited by palpation did not change when the patient was moved in another position. A point which I particularly

noted was that the thigh corresponding to the injured kidney was markedly flexed, and when the patient was asked to straighten it he complained of considerable pain.

The next morning the bowels had moved and the urine voided spontaneously contained very little blood. The abdomen was softer, but the area of dulness on the right had not changed, and by palpation an indistinct tumour could be felt in the right renal region. The pulse was of fair quality at 115, and the temperature was normal, although in the evening it rose two degrees. During the day a large quantity of urine was passed, dark brown in colour, and, microscopically, many red corpuscles were found, although there were no roulettes. A positive Heller's test was obtained. Three days later there was no distension, but the dulness remained, and the tumour, no longer tender, was distinctly felt on the right side, commencing under the costal border, and extending along the psoas nearly to the bladder. The urine still contained old blood. One week later the tumour had decreased markedly in size, there was no more pain, and dulness could no longer be detected along the psoas. The urine still contained blood, but in small amount, and the patient felt well. The left thigh can now be straightened without pain. Two weeks after the accident the urine contained practically no blood nor albumen, and the patient desired to get up, although the right renal region was still somewhat tumefied. From this time on he rapidly improved, and was allowed to leave his bed twenty-seven days after the accident. Six months afterwards no evidence of any renal disturbance could be detected.

The most constant symptom of laceration of the kidney is without doubt blood in the urine, which is present in very large amounts when the renal parenchyma is the seat of the injury and extends to the calyx or renal pelvis, or when there is extensive bruising of the renal tissue. A rupture of the ureter or bladder, although also giving rise to hæmaturia, may be excluded in the absence of other characteristic symptoms. Immediately after the injury, a varying quantity of pure blood will be found in the urine in some cases, while in others, where the bladder is distended, there will be a decided desire to micturate, although the patient may be unable to accomplish

the act. If a catheter is passed, the urine withdrawn will contain considerable blood and coagula.

The hæmaturia frequently subsides soon after the injury, so much so that within a few days no blood elements will be found, either microscopically or chemically, while in other instances, where the laceration or contusion of the parenchyma is extensive, blood may be present in the urine for a number of weeks.

There is one fact to which I wish to call special attention, and that is, that simple palpation of the kidneys will in many instances give rise to a slight amount of albumen in the urine afterwards, which is probably due to the pressure exercised in the examination, and if the renal glands are normal, it will rapidly disappear.

It is of considerable importance to ascertain whether any other of the abdominal or thoracic viscera are injured at the same time as the kidney, and if so, to fully appreciate the consequences, because the prognosis may depend more upon these than on the renal lesion. In all probability, the most frequent complication is fracture of the lower ribs, but single fractures of the ribs are extremely rare, and I am only aware of two cases, one where the seventh rib was fractured, and in another the sixth. These fractures are only serious when the pleura has been ruptured. Naturally, laceration of other viscera, such as the liver, spleen, or intestine, is of extreme danger, and in the case of the liver and spleen a rapidly fatal internal hæmorrhage will result, if the lesion is not recognised and treated. Then, again, when the intestine has been ruptured, peritonitis immediately ensues, and the outcome of the case will, of course, depend upon the rapidity with which surgical interference is undertaken. Should the peritoneum alone be ruptured without the intestine being involved, septic peritonitis need not of necessity result, when an aseptic urine enters into the peritoneal cavity, as has been recently proven by experiments. Of 14 cases collected by Petroff, where the peritoneum had been injured and urine had escaped into the peritoneal cavity, only one instance of septic peritonitis occurred which ended fatally, so that from these figures, it at once becomes evident that we probably have no idea how many times urine may escape into the peritoneal cavity after

an injury to the kidney and recover without being operated on, and where the diagnosis of this occurrence is not made.

Should evidences of infection of the blood or urine collected around the injured kidney appear, a peri- or para-nephritic abscess results, which certainly endangers the patient's life from the formation of pus and the breaking down and disorganisation of the surrounding tissues, particularly so if the collection should rupture into the thoracic or peritoneal cavities. The bacteria of typhoid, gonorrhœa, or tuberculosis have in some instances been shown to be the etiological factor of secondary infection, and in one case of renal traumatism it was due to the colon bacillus.

There is still much difference of opinion regarding the treatment of renal traumatism, and while some are in favour of temporisation, at least in the milder cases, there are others who maintain that immediate surgical interference is imperative. From my own experience, I am led to believe that, by carefully watching the case, many kidney injuries may be recovered from without surgical interference, but one should, in these circumstances, always be ready to operate at a moment's notice, if the symptoms of severe hæmorrhage become marked, or if signs of pus formation show themselves. In such circumstances, immediate nephrotomy or, possibly, nephrectomy, should the condition of affairs warrant it, must be resorted to. However, before removing a kidney, the functional activity of its fellow must be ascertained at all hazard, if one does not wish to expose himself to unfortunate results.

My third and last case of renal injury is as follows:—A workman, 47 years old, fell from the second story of a house upon a load of bricks, striking on his left side. When seen, a few hours after the accident, he was unconscious, extremely anæmic, but with a fairly strong and regular pulse at 100. The abdomen was considerably distended, but the patient did not give evidence of much pain when palpation was practised. The left lumbar region appeared tumefied, and the skin covering it was severely contused. Fracture of the eighth, ninth, and tenth ribs posteriorly was discovered. The bladder appeared to be distended, and, by catheter, 275 cc. of dark bloody urine, containing fresh coagula, were withdrawn.

The temperature was 36° C. The patient was placed in bed, and ice-bags applied to the left lumbar region. During the night 700 cc. of bloody urine were passed containing quite an amount of fresh blood, while microscopically, along with well-preserved red cells, were found a number of shrunken red blood corpuscles. The next morning the temperature was normal, likewise in the evening. The patient was kept on a strict milk diet. For the next four days the urine contained large amounts of blood, and the temperature remained normal. On the fifth day the patient had a slight chill, and the temperature rose to 39.5° C. and the pulse went up to 120. At the same time the patient complained of the left renal region, which had become quite sensitive to pressure, and it was found that the tumefaction had greatly increased in size. As the temperature oscillated around 39.5° C., and the pulse remained at about 120 for the next three days, as the renal tumour continued to increase and become softer, the tongue brown, and the patient complaining of headache, it became evident that a perirenal suppuration was going on, so that on the ninth day after the receipt of the injury, a transversal incision was made over the left kidney, giving exit to about 400 cc. of dark brown pus, with a highly urinous odour. Exploration of the kidney showed two lacerations in its parenchyma, but the renal pelvis was not damaged. Free drainage was instituted, and from this time on the patient made an uninterrupted recovery, being discharged five weeks after the accident with perfectly normal urine, and the lumbar incision completely closed. A careful microscopical examination of the urine four months after the accident revealed no evidences of any remaining lesion of the kidney, and the patient expressed himself as feeling perfectly well.

REVIEW OF THE DISEASES OF THE RESPIRATORY TRACT.

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FOR success in treatment of tuberculosis so much depends on its early diagnosis, that Grancher's paper on the Early Diagnosis of Pulmonary Tuberculosis by Auscultation, read before the Paris Congress, is well worth considering.

The views developed in this paper were first brought forward by him in 1882, and the experience of succeeding years has only served to confirm their truth.

Grancher finds in *auscultation* the most reliable means for the earliest possible detection of the invasion of the lung by tubercle. He is averse to the use of tuberculin, thinking the local reaction may possibly be dangerous. The X-rays he does not find of service except in some instances of deep-seated or interlobar disease. The presence of tubercle bacilli in the sputa he rightly regards as indicative of softening of the diseased areas, and therefore as a late piece of evidence.

The task he sets himself is to detect the presence of discrete tubercles still separated by healthy lung from one another, the real condition of infiltration or invasion which Laënnec had declared it impossible to recognise.

French medicine, according to Grancher, surprising as it may seem, still hesitates to make a diagnosis of phthisis until four or five of the signs indicative of the "first stage" of phthisis of Laënnec are present, viz. : weak, harsh, or divided inspiration, bronchophony, diminished resonance, prolonged expiration, dry râles. As he points out, these are the signs of condensation of the lung and even of softening, not of the early invasion.

An alteration in the quality of the *inspiration* is the sign which, according to him, marks the presence of discrete tubercles. Such an alteration, permanently present and localised to the apices, is sufficient for the diagnosis of

phthisis, especially when accompanied by slight fever and loss of strength. The altered inspiration may be harsh or weak, or harsh and weak, or harsh and divided. Weak inspiration, he holds, is most common, and next to it harsh, low-pitched.

At this stage the voice conduction, the percussion note, and the expiration are all normal.

He quotes some very interesting cases in which this sign was first noticed and the diagnosis confirmed, by the gradual appearance of other signs and finally by the presence of tubercle bacilli in the sputa. He also quotes in proof a post-mortem on a child in whom this altered inspiration was detected, and who died a few days later of scarlatinal nephritis. The apex of the lung was found still crepitant, slightly congested, and containing discrete tubercles.

The anatomical condition corresponding to this is the presence of tubercles in the infundibula just before the expansion into the air sacs occurs, impeding the entrance, the alveoli themselves being slightly congested, but otherwise unaltered. There is no scope here for dulness on percussion or increased conduction.

As the next step, increase in vocal vibration is added to the change in inspiration, there being now a state of congestion around the tubercles increasing the density of the lung.

To these are added later again diminished resonance and prolonged expiration.

Occasionally such weak or altered inspiration is not confined to an apex, but extends over the whole lung. This signifies, Grancher believes, the presence of enlarged glands pressing on the bronchus.

Among the many reports that have been published on the treatment of pulmonary tuberculosis by various "specific" agents, the figures of Trudeau seem to merit most attention. As other methods have been usually employed at the same time, it is difficult to assign to each its due share of the credit. On the one hand, one reads lists of cases showing the marked superiority in the results which follow the use of a specific in addition to general hygienic treatment, a superiority which is

claimed for all these agents alike, while, on the other, one hears of their gradual disappearance one by one.

Among published results Trudeau's (Lawrason Brown, *Zeitsch. f. Tub.*, 1904) are the only ones which have been put to the test of time.

From 1890 onward, he has never ceased the use of tuberculin in some form or other, and during all these years has kept in touch with his old patients ; the figures of this paper represent the experience of these years, and enable us to contrast the permanence of the tuberculin-treated cases, as compared with those treated only by general hygienic methods. This is the real test, as he says, of the future of cases after they leave the sanatorium and return to their former occupations.

A very large number of incipient cases become arrested under ordinary methods of treatment, so that figures, on discharge from the sanatorium, are not convincing. Even here, though, the figures, as with most observers, are somewhat in favour of the tuberculin-treated cases.

For the purpose of estimating the comparative permanence of the arrest in the two classes, he has compared the post-discharge mortality since 1890 of the tuberculin-treated cases with that of the total number of cases treated during that time.

The results show a remarkable advantage in favour of tuberculin : as time elapses, it is found that the proportion of tuberculin-treated cases that remain well is greater than the proportion of total cases who remain well, and the percentage in its favour increases with the lapse of time.

To quote the table of those discharged apparently cured :—

Number of Years after Discharge.	Total.	Tuberculin.
3 - -	93	102
4-6 - - -	81	95
7-9 - -	83	95
10-12 - - -	68	86

Summary.—The cases treated included incipient, advanced, far advanced : for the far advanced tuberculin is useless, Trudeau finds. The advanced cases showed, while under treatment, a considerable percentage in favour of tuberculin

especially among those who reached an apparent cure, and the same is true of the incipient cases. As promoting permanence of cure, tuberculin seems to be a valuable adjunct in treatment.

Fat Embolism of the Lung.—Connell (*Journ. Amer. Med. Assoc.*, February, 1905) reports two cases of this accident, in both of which recovery took place, and gives an interesting account of the symptoms.

Though fat embolism must take place to some degree in almost all cases of fracture, serious symptoms arising from it are rare. Fracture, of course, is the most usual cause, but operation, especially on bones and joints (and several cases have been reported in orthopædic work), gives rise to it. It occurs also, though very rarely, apart from accident or operation, for instance, in diabetes.

Taking fracture as the most common cause, the fat, derived from the bone marrow, gains entrance to veins, which have been ruptured by the accident, and is carried to the lungs, where a series of emboli are formed which may even give rise to infarction. Some of the smaller drops may pass through the pulmonary capillaries and enter the systemic circulation, and form emboli there. To such emboli reaching the cerebral vessels many of the terminal symptoms of the condition are believed to be due.

Not all the marrow of the femur would be sufficient to occlude enough of the pulmonary circulation to lead to fatal asphyxia, Scriba says, and suggests that the respiratory symptoms which are so prominent, must be due to interference with the nervous controlling centres. The lung symptoms, however, are too prominent and too well supported by physical signs for one to be able to accept this view. The terminal convulsions and coma are, no doubt, due to central emboli, and the cardiac embarrassment, which is so marked a feature, may be due to coronary emboli.

Though the impaction of the emboli must, in most instances, date from the moment of accident, as the local thrombosis, which soon follows the injury, would close the way, yet, in spite of this, the symptoms are usually long delayed (6 hours to 15 days), and there is an intervening period of perfect ease—*period of euphoria*. Perhaps sepsis, with softening of the thrombi, may explain this curious delay,

Restlessness, pain, and cough, with dyspnoea, mark the onset of the symptoms; expectoration, frothy and blood-stained, becomes profuse, and there may be considerable hæmoptysis. The signs of œdema and consolidation of the lung appear, and the heart becomes rapid and feeble. The diagnosis is *proven* by the presence, often in abundance, of fat globules in the urine and in the expectoration.

Fever is commonly present, even in cases where sepsis can be excluded, and may rise as high as 105°.

The treatment is to support the heart until the fat can be removed and absorbed by the phagocytes, for, though always serious, these cases are not necessarily fatal.

Ingals (*Journ. Amer. Med. Assoc.*, May 27, 1905) reports another case of successful removal of a foreign body (in this case, a collar stud from the left bronchus) by Killian's method.

The accident had happened 14 months before, and in the interval the man had lost 35 lbs. in weight, and suffered from fever and continuous cough. The left side of the chest was contracted, and the heart drawn to the left, while there was dulness, with absent breath sounds and fremitus, over almost the whole lung. So dense was the shadow that radio-scropy revealed nothing. The ability to see and locate the body, when invisible by X-rays, is one of the peculiar merits of *bronchoscopy*.

The operation was performed under chloroform, and was much interfered with by profuse secretion—in spite of the previous injection of atropine—and the constant welling of pus, which was only partially overcome by constant swabbing.

Six months later the patient was strong enough to work 12 hours a day, and cough and fever had quite disappeared.

Germain's case (*Journ. Amer. Med. Ass.*, July, 1905) is interesting from the age of the patient, an infant of twenty-one months, interesting again in the fact that no anæsthetic was used.

Tracheotomy had been done without relief, and the opening was used for the removal of the foreign body, a nut kernel, which lay in the right main bronchus. Previous to operation there had been marked expiratory dyspnoea with râles over both

lungs ; a sharp attack of broncho-pneumonia followed, but a good recovery was made.

Thirty-two successful cases had been reported up to August 1904, with only an occasional fatal result. Under previous methods the mortality of these cases was very high, ranging from 30 per cent. upwards. The whole subject was discussed in a previous number of this review.

Ingals and Germain have facilitated the operation by placing the electric lamp in the tube, while Coolidge, of Boston, has improved the original model of forceps.

Coolidge, who reports a case of removal of a safety pin from the œsophagus by the same method (*Boston Med. Journ.*, May, 1905), strongly advises, if a general anæsthetic is given, the previous subcutaneous injection of atropine and cocainisation of the pharynx.

The *mycoses* of the lung, *i.e.*, the invasion of the lung by fungi, have not only a pathological interest, but are important clinically both on account of their resemblance to tuberculosis and also because of the amenability of some of them to treatment by iodide of potash.

So close is the resemblance of these lesions to the truly tuberculous that the name pseudo-tuberculosis has been suggested for them, the likeness extending not only to the advanced destructive stage of consolidation and excavation, but to the earlier stage, in which structures so closely resembling miliary tubercles are formed that only microscopical investigation can distinguish between the two.

Ashton and Morris (*Journ. Amer. Med. Ass.*, September, 1905) have added two to the small list of reported cases of streptothrix invasion. These fungi may be pathogenic or simply saprophytic ; in the cases reported, it was impossible to say which, as neither resulted fatally, one indeed improving greatly under treatment.

Repeated examination in both cases for the tubercle bacillus was negative. The streptothrix mycelium, not staining with carbol fuchsin, escaped detection until the sputa were examined by Gram's method, and the authors suggest that, if this reagent were employed in the group of cases which have all the appearance of phthisis, but in which the tubercle bacillus can

never be found, more instances would be discovered. The masses appear in the sputa as small yellowish lumps, somewhat like actinomycetes.

The first patient was a male, æt. 22, who suffered from persistent cough, with copious fetid expectoration. The clinical picture was typical of chronic phthisis except for the fœtor. Sixteen examinations, however, failed to reveal the tubercle bacillus. Râles were present over both lungs, including the left apex, while the left base was dull, with signs of a cavity.

Under open-air treatment with high feeding the man improved sufficiently to be able to return to work.

The second patient gave a history of only one month's illness, though probably, from the extreme thickening of the pleura, this was an understatement. The symptoms were almost exactly those of the preceding, except that the sputa are not said to have been fetid. Again there were extensive signs in both lungs, and especially at the left base, which was quite dull.

Coupled with the above may be the case reported by Eisendrath and Ormsby (*Journ. Amer. Med. Ass.*, October 15) of *blastomycosis* with blastomycetes, a budding fungus best known as the cause of skin disease, in the sputa. Four cases of systemic blastomycosis have now been reported, three of which were coupled with cutaneous lesions.

The clinical picture of these cases is that of pyæmia, multiple abscesses being present throughout the body, accompanied by tubercles closely resembling the true miliary tubercle.

In the reported case the illness started with pain in the right side of the chest; not till four months later did typical lesions, nodules breaking down into subcutaneous abscesses and leaving ulcers, appear in the skin. In the pus of these abscesses the organism, circular and double-contoured, was found chiefly in budding forms, but on cultivation there was much mycelial growth. Similar organisms were recovered from the sputa.

The patient was emaciated and feverish, with signs of consolidation at the right apex and in the upper lobe.

With potassium iodide and radiotherapy great improve-

ment was effected. The patient, however, soon discontinued treatment, and later was re-admitted, with signs of spinal disease, probably from the same cause.

Roger Morris (*Med. News*, September, 1905) reports a case of *dermoid cyst* of the mediastinum, and, reviewing all the previously reported cases, establishes the diagnostic symptoms and the best mode of treatment.

The patient was a man, æt. 23, in whom, nine years before, what was called pneumonia followed on a blow in the chest. A year later he suffered from another attack of pneumonia, in which he suddenly coughed up a large quantity of pus. Since then he had suffered from cough and expectoration; there had been several severe hæmorrhages, and finally hairs appeared in the sputa.

From the second rib downwards over the left front there was relative dulness, the upper border of which sloped downward towards the axilla, and was continued into the back. Traube's space was clear. The breath sounds over the affected area were weak, and mixed with râles, the whole suggesting a tumour or fluid collection covered by a thin layer of lung.

These dermoid cysts, of course, are due to foetal misplacement, by the invagination of glandular structures, or by the closure of foetal clefts. They vary in size from a walnut to a child's head; though originating in the anterior mediastinum, the larger ones extend widely, into the pleural sac, for instance, or between the pericardium and lung, and contract such firm adhesions to surrounding structures that their complete extirpation is hazardous and often impossible.

Their general position is that of a tumour beneath the upper half of the sternum, extending outwards on one or both sides.

The cyst wall is of the usual structure, bone, teeth, and cartilage having been discovered therein, and is lined with an epidermis. The contents of the cyst are derived from the wall, and form a greasy mass, in which under the microscope cells resembling those of the stratum corneum of the epidermis, fat droplets, cholesterin crystals, and hairs are seen—an important aid to diagnosis, considering that in nearly half the cases the cyst has ruptured into a bronchus.

Of the contents, the hairs are pathognomonic, the other elements highly suggestive.

Though foetal structures, these cysts remain latent for a long time, as a rule till puberty, when often a sudden, rapid development occurs.

The initial symptoms are vague, as a rule: dyspnoea on exertion, pain, pleurisy, hæmoptysis.

With the growth of the cyst dyspnoea becomes more urgent, pain more severe, and expectoration more abundant, as much as 500 c.c. in 24 hours, partly from the cyst if rupture has taken place, and partly from coincident bronchitis, which is constant and intense. The physical signs on examination, though not absolutely diagnostic, are suggestive. In the main they are those of an intrathoracic tumour with certain points of difference from the common forms.

A fulness or bulging of the anterior thoracic wall has often been present, situate usually between the second and sixth ribs and involving the sternum.

On percussion absolute dulness corresponding to the fulness is the rule; the dulness starting high up in front, and extending downwards to the lower lung border. Over the dull area breath sounds are, as a rule, absent. In those cases where the cyst is covered by lung tissue, the percussion note will only be partially dull, and there will be weakened breath sounds with râles.

Though surrounding organs, like the heart or liver, may be pushed out of position by the pressure of the cyst, the pressure signs so common with mediastinal malignant growths—distension of the superficial veins, laryngeal paralysis, inequality of pupils and pulses, cyanosis, and oedema—have only been noticed in connection with those cysts which have taken on a malignant growth. As contrasted with aneurism, the special peculiarities of the latter are wanting, and in the few cases where pulsation of a dermoid has been present, it has not been expansile.

The signs, then, are those of some mediastinal condition of marked chronicity and lacking the rapid progress and resistless invasion of malignancy.

Encysted pleural effusion is the condition for which dermoid cyst has most usually been mistaken, and from this or

hydatid, a diagnosis can only be made by examination of the aspirated fluid. Abscess of the mediastinum runs a shorter course, and is attend by marked fever.

Though the diagnosis may be narrowed down in this way, it can only be made absolute by the findings of the sputa mentioned above, especially hairs—and these have only been recognised in 10 cases out of the reported 59—or by exploratory puncture, which has been carried out with complete success in several cases.

Treatment.—Considering that death is practically certain, Morris says, to follow in a few years, operation is indicated as soon as the disease has progressed sufficiently to make the diagnosis possible. This has now been done in 20 cases: of these, 14, or 70 per cent., survived the operation, and were either cured or made satisfactory recoveries. "In most instances the treatment has consisted in the evacuation and drainage of the cyst, after resection of part of one or more ribs. It has seldom been possible to make a total extirpation of the tumour, chiefly on account of the adhesions. A marked contraction of the cyst usually follows in the course of a few months, leaving only a small fistula."

In view of the bronchitis so constantly present, chloroform is recommended in preference to ether.

The treatment of pneumonia is subjected to careful criticism by W. V. Brem (*Johns Hopkins Hosp. Bull.*, October, 1905), in an article entitled "The Action of the Toxic Agent in Acute Pneumonia."

The acceleration of the respiratory rate he finds is not dependent on pain or fever, nor is it seen in other febrile conditions like typhoid. On these grounds it is attributed to the toxic agent, whose action he regards from the way the accessory muscles of respiration are brought into play as stimulant to the respiratory centre.

On the side of the circulation the toxin is again regarded as a stimulant, to the cardio-accelerator centre and the heart muscle, for he finds that the heart rate is increased, and, working with the sphygmometer, that the systolic blood pressure is high, the whole denoting a large cardiac output.

In the milder cases then the condition is already one of stimulation of these centres.

Where the action is more intense—the graver cases—stimulation passes into over-stimulation, leading to exhaustion of the centres. The respiratory centre suffers more than the circulatory: ultimately, with the respiratory insufficiency, this centre may also fail, exhausted from over-stimulation.

For though the rate of respiration is so increased, and the quantity respired is actually increased, the interchange may be less effectual, the depth of breathing tending to vary inversely with the rate.

The chief symptoms then are due to the action of the toxin.

In our inability to destroy the toxic agent, our chief aim in treatment should be to eliminate it, by internal hydrotherapy, *i.e.*, by the action of the kidneys, which is to be provoked by copious draughts of pure water.

An interesting case is quoted in which during the twenty-four hours preceding improvement there was a greatly increased urinary output, the result of copious imbibition.

Next Brem would husband the patient's strength by abating fever and delirium, and procuring rest: the chief means to this end is external hydrotherapy.

Partly to the same end, and partly for its effect on the respiratory centre, he strongly advocates the use of heroin, which has been shown by experiments to reduce the rate of respiration 30—50 per cent., but to more than compensate for this by increased depth. It is to be preferred to morphia, which does not give equal compensation for its slowing of the rate.

Brem has given gr. $\frac{1}{4}$ hypodermically with good results, *viz.*, sleep, breathing slowed, and diminution of cyanosis. Though he seems to have pushed the drug rather, bad effects were noticed in one case only, where the heart became irregular and intermittent.

He finds the results of oxygen quite temporary, and thinks it useless and possibly dangerous.

Alcohol he gives to alcoholic cases, but forbids it when enfeeblement of the cardiac or respiratory mechanism has set in, for its general effect is to lower blood pressure. For these

conditions of insufficiency, he prefers the tincture of digitalis to all else, but confines its use to conditions of low blood pressure associated with cyanosis and signs of œdema of the lung and diminished urinary output. Its effect is to raise the blood pressure and so increase the urine and relieve the asphyxia.

Where there is no sign of respiratory insufficiency, and the blood pressure is not low, it is without effect.

Caffein and strychnine he avoids, because they are stimulants of the respiratory centre already over-stimulated.

His dislike of the common routine use of digitalis and strychnine is no doubt wise.

Moty (*Gaz. des Hôp.*, August 29, 1905) calls attention to the advantages of a posterior vertical incision for the drainage of empyemata. The object of this incision is that the drainage may be at the lowest point of the pleural cavity when the patient is lying on his back. With this in view the line of incision has been pushed farther and farther back. For years Moty used a posterior horizontal incision, but discarded it because of the damage it involved to the latissimus dorsi. Moreover, Walther has shown that in the dorsal position the lowest point of the pleura coincides with the seventh, eighth, or ninth space, two fingers' breadth from the vertebral column.

The incision Moty now uses crosses the middle of the space between the costal angle and the costo-vertebral articulation, two fingers' breadth from the spine, at the level of the angle of the scapula. It is made slightly oblique from without inwards, the patient's arm being drawn forward, so that when the arm is replaced, it may be truly vertical.

His results even though he does not resect rib when the patient's condition is grave, seem to be very good. The posterior incision is not uncomfortable even though the patient lies on his back.



THE TREATMENT OF CRUSHED HANDS.

By A. J. FAIRLIE-CLARKE, M.A., M.B., M.C. (CANTAB.), F.R.C.S. (ENG.).

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ACCIDENTS by which the hand is crushed are so common, and the serious crippling and loss of wage-earning power to which they give rise are often so serious, that these injuries may be said to be some of the most important with which we have to deal in surgery.

The class of injury of which I wish to write is that in which the hand, or some of its parts, has been crushed, lacerated, pulped, or flayed, and often ingrained with dirt; injuries which are extremely common amongst people of both sexes engaged in factory work in large cities, and amongst labouring men generally. The treatment of these injuries is essentially the same, and, before speaking of this in detail, it will be simpler if the general principles underlying this treatment be first mentioned. These general principles are: cut little, stitch little, drain freely, wash freely.

The knife is rarely needed in the treatment of crushed hands. Set primary amputations are almost always bad surgery. What trimming has to be done is best done with scissors, and anything more than this is often unnecessary. If a digit is so damaged that it can be removed by a few snips of the scissors, it will seldom be worth trying to save; but otherwise, I think, an attempt should usually be made to save it.

Whilst operating on a crushed hand, I prefer to have the limb made bloodless with a tourniquet, for the parts are then more easy to distinguish. Hæmorrhage is rarely troublesome; it is never necessary to apply ligatures to digital vessels, and rarely to vessels in the palm, as the pressure of the dressings will, as a rule, stop all bleeding. I prefer not to release the tourniquet until the bandage has been applied; time and mess are thus saved. The first dressing I have usually employed has been one of sterilised gauze; but if much of the hand is stripped of skin, boroglyceride on lint, or moist lint covered

with jaconette, is to be preferred, for it sticks less to the raw surfaces when the dressing has to be changed.

No more sutures should be used than will suffice to keep flaps loosely in position; even these stitches frequently cut out, and nothing is gained by using a larger number, for close stitching hinders free drainage, takes unnecessary time, and causes needless pain. The parts must be brought together without tension, and if they cannot be brought together so, they are better left apart. This even applies to bringing flaps over the ends of finger stumps, where the temptation to drag the parts together is strongest.

At first the limb should always be placed on a splint, and a wide splint, confining the whole hand and extending as far as the elbow, will be found more comfortable than any finger splint. The position in which most patients prefer the hand to lie is resting on a pillow at their side, and the splint should be secured to the pillow by a turn of bandage to guard against the limb being inadvertently moved during sleep. A few people prefer their arm supported by a sling, to rest across their chest. An excellent plan is to swing the whole arm and forearm in a sling hanging from a pulley fixed above the patient's bed; this sometimes gives great relief when the limb is much swollen with inflammation, or from interference with the return of its venous blood, the raised position helping to empty the limb.

Free drainage is essential, and time is saved by its use, for it prevents, or cuts short, cellulitis spreading from the wound. Usually gauze strips form a sufficient drain, a fold being loosely tucked, not tightly packed, under flaps and along tears. There is no need to be in a hurry to remove this gauze. In two or three days it will be loose, and can be removed without pain. More frequent changing of the gauze serves no useful purpose. Rubber drainage tubes will sometimes, however, be found to answer better than gauze. They need seldom be taken out if they are syringed through, and turned round on their long axis daily; in this way granulations are prevented from growing through the side openings of the tube, fixing it in place, and blocking its lumen. When the time comes for a smaller tube to be inserted, this may be drawn into the end of the larger tube, and there secured

with a thread ; the old tube is then withdrawn, the new tube at the same time taking its place. By this plan pain is avoided, the tube never being taken out except when it is changed for a different one.

The washing of the injured part is important. Should it be necessary to give the patient an anæsthetic, a thorough cleansing of the limb may be undertaken, first the nail-brush and afterwards any desired antiseptic¹ being used. But frequently anæsthesia is unnecessary, and then such a thorough cleaning is impossible from the pain it would involve, nor is it required. The use of the arm bath² is of value in cleansing the limb, and, especially if the crushing has been severe, I like to have the hand bathed for half an hour night and morning from the very commencement of treatment. These baths should be continued for a week or longer as the case demands. A moist dressing should be employed in the intervals between the baths. Nothing does better than the common boracic or carbolic fomentation, and there is no need to renew this more often than every six or eight hours, or even less frequently. When the wounds are becoming clean, or sooner if the parts be much sodden by the bathing, the baths should be used less often, or discontinued altogether, and a different dressing substituted for the fomentations. The feature of the dressing now to be used is that it should not stick to the raw surfaces, and so cause pain when it is removed. One of the following will answer well :—Boroglyceride on lint, red lotion on lint, or carbolic oil on lint, each of these dressings being covered with gutta-percha tissue, while boracic ointment smeared on lint is useful as the wound closes ; these dressings should not be changed more frequently than once a day. After all, the nature of the dressing matters little, provided it be clean and comfortable. Injuries of the different parts of the hand now call for separate mention. The fingers are the parts of the hand most commonly crushed, and the parts where conservative surgery most commonly fails. Yet every effort should be made to save a finger, for it is impossible to say how much use may be gained, even in a badly smashed digit. A stiff finger is far better than no finger at all, even in the hand of a working man, where

¹ Carbolic, $\frac{1}{10}$; perchloride, $\frac{1}{1000}$; biniodide, $\frac{1}{100}$.

² Carbolic, $\frac{1}{4}$; iodine, $\frac{1}{2}$ drachm to the pint ; boracic lotion.

appearances are thought to matter least. Which finger is stiff makes a considerable difference. Owing to the slips connecting the common extensor tendons of the middle and ring fingers, a stiffly extended middle or ring finger prevents free flexion of the other fingers far more than does a stiff index or little finger ; hence amputation of one of the former is less to be avoided than that of the latter, nor is the hand so much disfigured by the loss of the middle or ring finger as by that of one of the others. Compound fractures and compound dislocations do not demand amputation, and, provided only there is enough blood supply for the parts beyond, no amount of stripping of skin need do so either. If the parts can live, there is no cause to remove them ; time is often the only test of this ; frequently it shows that a part which was thought past recovery will live and be of use. It is true that all parts which retain their vitality will not be of use ; a crushed finger may not become gangrenous, but may be so damaged by suppurative arthritis, or bone necrosis, that it may have to be amputated ; but this could not be foretold, and the patient has rightly had the benefit of an attempt to save his finger.

Resections of the finger joints after injuries are seldom satisfactory, the finger being of little use, as well as shortened, deformed, and unsightly ; yet they are sometimes worth attempting. The thumb, the most valuable part of the whole hand, should never be primarily amputated unless it hang by strands, which can easily be divided with scissors. Every attempt should be made to leave some sort of stump to which the fingers can be opposed, even a short, stiff, scar-covered stump being of the greatest value. If the distal joint of the thumb be cut straight off, leaving no flaps which can be brought over the cartilage-covered head of the first phalanx, do not re-amputate higher up ; either allow the wound to granulate, or cover over the stump by a flap taken, by the Italian method, from the side of the index finger.

Of injuries to the palm I need say little. The secret or success I believe to lie in free drainage, and here, especially, few stitches are needed. Broken metacarpal bones will take care of themselves, and nothing more than keeping them quiet, in a good position on a splint, is needed. If the carpal joints be opened, the call for free drainage is all the more

imperative, but this injury would not, in itself, call for amputation. When, after an accident, some or all the fingers and parts of the palm have become gangrenous, the gangrenous parts alone should be removed with the knife. It is unnecessary to aim at covering in the raw surfaces with skin flaps; these surfaces should be left to granulate, being later covered with skin grafts if necessary. If the parts are cut away until skin can be brought over the cut ends, much valuable hand may be wasted. But when a secondary amputation needs to be done, no text-book method is likely to be of use, for flaps must be taken from any available source to cover in the stump, and this stump must be as long as possible. At times, when the amputation passes through the forearm, a long flap, containing either the radial or ulnar artery, and from two to three diameters of the limb in length, may be peeled up from along one side of the hand and forearm and turned back over an area of bare muscle on the other side of the limb, covering in the bones, though cut lower down than skin extends on this side of the limb. A considerable length of limb may be saved by some such plan. When tendons have been crushed, not merely divided, I have seen little good come from suturing them.

Not uncommonly, in machinery accidents, the skin is stripped from the forearm and hand as a more or less complete glove, and remains hanging by its attachments to the palm and fingers. As a rule this skin may be replaced after it has been cleansed, and is to be kept in place by a stitch or two. The space beneath the replaced flaps must be adequately drained by tubes or gauze. It is surprising how much skin, replaced in this way, will retain its vitality. When the hand has been caught between hot rollers, a combined burn and crush results. The treatment of this needs no special comment beyond saying that the parts are apt to look even worse than they really are; the dead white of the sloughing skin suggests that the whole depth of the hand has been destroyed, whereas the skin alone may have suffered. So waiting is here imperative, before it is possible to say how much can be saved. Sometimes the burn injures one side of a finger more than another, and though the digit has to come off, yet a tongue of skin may extend along one side of it, and this may be saved, being turned down over some granulating area,

perhaps on the palm, where it may be made of use to cover a bare patch.

In addition to the healing of the wounds, the surgeon has to restore the hand to usefulness so far as he can. A limb kept long on a splint wastes, and becomes very stiff. To avoid this stiffness, movements of the fingers and massage must be employed. The damaged parts must not be moved till they have soundly healed, but fingers, the movement of which does not disturb the injuries, should be gently moved to and fro whenever the hand is dressed. Something may be done to increase the usefulness of a crippled hand, and to render it less noticeable by paying attention to the position of the fingers. Generally, if a finger is to be permanently stiff, it is better that it should be semi-flexed than in any other position. If the attachment of a tendon sloughs, as when the whole contents of a finger sheath separates, then the pull of the unopposed muscle will determine the position of the finger ; but if part of the course of a tendon sloughs, as, for example, that part which passes beneath the annular ligament, then the contraction of the scarring tendon will decide the result. With this as a guide, passive movements should be undertaken to counteract deformity. As the wounds granulate, say, at the end of a fortnight, massage of the forearm muscles may be begun. Once the damaged parts have soundly healed, attempts, both active and passive, should be made to move them, and these attempts should be persevered in daily. A month or six weeks after all is healed, if the movements are not free, the patient should be put under gas or ethyl chloride, and the stiff joints moved through their complete range of movement. The discomfort produced by this will subside in a day or two, but passive movements must be continued afterwards, or the stiffness will not be permanently benefited.

The disadvantages and risks of the conservative surgery of the hand are few ; they are loss of time, septic infection, exhaustion.

It takes longer to save a crushed finger than it does for the stump to heal after it has been cut off, but the gain to the patient is generally well worth the delay. The danger of septic infection is not great if the damaged parts are allowed

to drain freely and are often bathed. Once a cellulitis has commenced, incisions will be needed to ensure good drainage, and these incisions should be large. Two or three incisions, three or more inches in length, in the hand or forearm, I consider to be of more value than several smaller cuts. Should these incisions require to be made near important structures, and the important structures are the nerves, tendon sheaths, and joints, then a tourniquet should be applied and a careful dissection made in the bloodless parts, care being taken that the structures mentioned are not damaged. Free drainage being secured, the arm bath must be perseveringly used, and the patient encouraged to keep the hand in the bath for as much of the day as possible. But the continued use of the bath is very fatiguing, so care must be taken to avoid tiring the patient. I have seen carbolic poisoning follow the prolonged continuous use of carbolic arm baths, so notice should be taken of the colour of the urine if carbolic be used in the baths, and, if the characteristic green colour appear, this antiseptic must give place to some other.

Exhaustion is apt to follow the more severe crushes of the hand and forearm : but it is then commonly due to the inflammation which has occurred in the damaged limb. If it is extreme, the arm may have to be amputated to save the patient's life, but a reasonable risk should be run in the hope that by free drainage and prolonged bathing the limb may be saved. The patient's general health must decide the propriety, or otherwise, of an amputation being done. These risks, run in attempting to save parts of the hand, are outweighed by the gain to the patient, if an increase of usefulness and lessening of disfigurement are obtained by conservative treatment.

In conclusion, I would say that, if I have seemed to speak too dogmatically, it is only from a wish to be clear. Doubtless, other methods of treatment answer as well as those I have detailed. After all, each case must be judged on its own merits, and what one man will think worth saving another will condemn. But so great are the gains of conservative surgery in the hand, and so small are its risks, that I would urge that few of these injuries should be touched with the knife, and that the treatment of more of them be left to nature and time.

URIC ACID AND DIET.

By F. C. EVE, M.D. (CANTAB.), M.R.C.P. (LOND.).

THE subject of dietary is occupying a great deal of public attention at the present time, and people are beginning to ask whether the enormous increase in the national consumption of meat during the last few decades may not be the cause of a great deal of ill-health, especially in persons in the latter half of life. Former statements, such as that of Virchow, that the highest achievements of the human race were attained by nations living on a mixed diet, have been somewhat discounted by the recent brilliant performances of the almost vegetarian Japanese. The present article is an attempt to review briefly and dispassionately the position of a dietary, which has at any rate the merit of a single scientific ideal running throughout it.

This ideal is the elimination from the diet of any food containing uric acid or any of its congeners. "Purin-free diet" is the more modern name for this dietary, the purin group being those chemical bodies which contain the radical $C_5 N_4$. Uric acid is the most important purin, but others are xanthin, hypoxanthin, thein, caffein, theobromin. To these are ascribed slow toxic properties.

Of what then does a purin-free or uric-acid free diet consist? The flesh of all beasts, birds, and fishes, and any soups made from them, all go by the board at once. The only food of animal origin which is permitted is milk, and milk products, such as cheese and butter. Eggs occupy an uncertain position. They contain no purins themselves, but in many individuals they increase the excretion of uric acid in the urine. White bread and all vegetable foods are purin free except peas and beans, asparagus, onions, mushrooms, tea, coffee, chocolate, porridge. Clearly such a diet is a very joyless one, as well as being socially a nuisance. In this country it would only be adopted by cranks or by those who were martyrs to some chronic disease, such as migraine, which was alleviated by the diet. It will be seen that this

diet is even more restricted than a vegetarian's, since it does not allow the purin-containing vegetables such as peas and beans, while the only animal foods are milk and milk products.

The credit of originating this diet and of working it out chemically and clinically belongs, I believe, to Dr. Alexander Haig. This gentleman was for years a martyr to migraine, which he alleviated by omitting meat from his diet, and finally cured by eating nothing which contained uric acid or its congeners. He then did an immense amount of valuable pioneer work on the influence of drugs and diet on the excretion of uric acid. He embodied his results in a large book in which uric acid is regarded as a circulating poison and as the direct cause of over a score of important diseases.¹ He maintains that any of these diseases can be cured simply by a one or two years' course of purin-free diet.

According to him, the uric acid circulates in a gelatinous form, raising the blood-pressure, obstructing the kidneys and acting as a chronic poison, causing languor, depression, headaches or irritability in the present, and arterio-sclerosis or any of his list of uric acid diseases in the future. To him there appear to be no doubts or difficulties, and one longs to share his belief, and put one's practice of drugs and diet on such a firm and coherent foundation. And the views of one who has done so much experimental work and who has achieved startling results in a very large circle of patients (disciples one almost calls them), are entitled to considerable respect. Unfortunately, however, he writes as a partisan and has allowed his enthusiasm to carry his views very much further than any one who has reviewed the evidence can possibly follow him. The truth of his views has been discounted wholesale by the work of other observers. Still, there is little doubt in my own mind of the brilliant results to be obtained with this dietary in a very few selected cases where all other treatment has utterly failed. Coming more or less within my own experience are several intractable cases of migraine, gouty eczema, and asthma, in which the diet alone seemed responsible for the cure. And in addition the patients reported that their sense of

¹ Haig's uric acid diseases include migraine, gout, epilepsy, hysteria, many mental diseases, fatigue and syncope, asthma and bronchitis, dyspepsia and gout of the intestines (with appendicitis), Raynaud's disease, paroxysmal hæmoglobinuria, anæmia, Bright's disease, rheumatism, diabetes, and arterio-sclerosis.

well-being was improved, and their sensations of fatigue were diminished. It is facts such as these which encourage us to attempt to winnow the wheat from the chaff in the current doctrines of the adherents of this kind of dietary. Of course a detailed criticism is quite impossible in an article of this length, and all that will be possible is a brief and unprejudiced statement of the present uncertain position of this question.

The following sentence is, I believe, an undoubted fact, and provides the fundamental justification for a purin-free diet:— In an ordinary person, on an ordinary mixed diet, of the uric acid and other purins which appear in the urine, only about half are due to the necessary wear and tear of the body; the other half are simply due to purins needlessly imported in the food. The former moiety is of course inevitable, but the latter moiety is avoided in a purin-free diet, and the body is thereby saved the needless labour of transforming and excreting all these unnecessary purins. And in persons who eat freely of meat and soups, this exogenous moiety may easily be much more than half the total purins excreted. The urinary purins may be regarded as the ashes of the combustion of proteid food; so that, to use a homely analogy, in our ordinary meaty diet, we are using coal which contains double the necessary quantity of ash, whereby the fire burns less brightly.

So that in dieting that very numerous class of patients who appear to have inadequate livers or kidneys, it does seem desirable to know the amount of purins in the various nitrogenous foods. And here we seem to meet a gap in our knowledge, for calf's sweetbread (thymus not pancreas), which is usually regarded as innocent food, is richer in purins than anything else,¹ owing to the millions of leucocytes of which it is largely composed. Dark meats and white meats also surprise us by containing about equal quantities of purins; and fish contains a good deal, though often about 50 per cent. less than meat. This apparent lack of accord in the relative injuriousness of the varieties of flesh between analytical anticipations and clinical experience is, to my mind, a serious difficulty, and leads one to suspect that we have not yet caught the real nitrogenous culprits, or all of them. Soups and meat extracts,

¹ A partial explanation of this discrepancy is, perhaps, the fact that thymus contains only as much "free" purin as ordinary meat, most of the purin being "fixed" in the form of nuclein, which takes days instead of hours to excrete.

of course, contain all the purins of meat and little or none of the energy-providing proteids. On this doctrine, therefore, they are particularly pernicious. Milk soups, however, can be made purin-free. Beer and stout contain traces of purins, but there is none in wines and spirits. Nevertheless, alcohol may, in some exceptional persons, cause a large increase of uric acid in the urine, even after a very small dose.

Salicylate of soda causes a very marked increase in the excretion of uric acid in the urine, and Haig uses this drug extensively to "wash out" the uric acid, with which he maintains the tissues are loaded in so many diseases. According to Walker Hall and others, however, there is no such action, and what really occurs is a modification of the ordinary nitrogenous metabolism, whereby more of the nitrogenous excretion in the urine appears in the form of uric acid instead of as urea. Probably in fact the salicylate causes the incomplete decomposition of uric acid instead of washing it out of the tissues. Walker Hall,¹ who is an extensive worker at this subject, and who keeps in touch with German workers in this field, also controverts Haig's fundamental statement that uric acid accumulates in the blood or tissues (except in gout, &c.), and hence that it is impossible to wash it out with salicylates or other drugs. He points out (*con.* Haig) that flesh foods do not contain uric acid as such, but as hypoxanthin and other purins. He thinks that the clinical ill-effects are due rather to the nature of the "uric acid combinations" in the blood than to the quantity of uric acid, *i.e.*, as to whether these combinations are irritating or the reverse. He denies that we have any drug which can be given in sufficient quantity to affect the circulation of urates in the tissues, except indirectly by stimulation of the liver or bowels.

Finally, Walker Hall considers that in health uric acid is a necessary stage in nuclein metabolism; that in disease uric acid is merely a symptom of conditions which hinder its solubility; and that uric acid is not the cause of the lesions. Hence that it is absurd to give drugs which increase the solubility of uric acid in a test tube. Pfeiffer, however, finds that uric acid in salt solution injected under the skin of a

¹ *Purin Bodies* (with bibliography). Sherratt and Hughes, Manchester 1903. The book describes the "Purinometer," a convenient clinical instrument for measuring the urinary purins.

gouty patient always produced an attack of gout, unless 5 to 8 c.c. of hydrochloric acid had previously been administered. And Falkenstein finds that gout and dyspepsia were much benefited by 40-60 drops of pure hydrochloric acid taken daily in large quantities of effervescent water.

But while we must struggle against becoming sucked into the vortex of the pathology of gout, it is necessary to our subject to attempt an answer to the primary question—are circulating purins capable of acting as chronic tissue poisons? If they are harmless, clearly there is no need to abstain from these pleasant substances. There is, however, a considerable accumulation of clinical and experimental evidence, tending to prove that purin bodies do act as tissue poisons, particularly in susceptible individuals, and where the cleavage of the proteid molecule proceeds abnormally. Possibly we may get light on the general question of the virtues of a purin-free diet by a brief glance at other modern food reformers.

First, there is the interesting story of Mr. Fletcher, of America, a confirmed dyspeptic, over 50 years of age, who regained health and strength by most protracted mastication. With Dr. Someren, he found that the body and mind could in this way be kept in extraordinary health with a half or a third of the ordinary consumption of food. The appetite was satisfied, and the gymnastic strength and endurance of Mr. Fletcher excited the surprise of the Yale Gymnasium Superintendent (a doctor). Next there are the recent astonishing experiments of Professor Chittenden, who investigated the question of the minimal amount of nitrogenous food necessary to maintain health and strength in 5 professional men, 8 university athletes, and 13 soldiers. The experiments had the great merit of long duration, none of them being dieted for less than four months, while some experiments lasted a year.

His results are set forth in a most convincing and dramatic manner in his book,¹ which proves that for at least this length of time, these types of men can subsist on half the 120 grams of proteid food which was formerly considered necessary to support life, and this again is of course very much less than the amount ordinarily consumed. On this diet, which was limited only in quantity, and not in quality, his subjects gained in strength and health, and did their muscular and mental work

¹ *Physiological Economy in Nutrition*, Heinemann, 1905. 148.

better, while those who suffered from headache or biliousness left them behind. Another result, very pertinent to our present subject, is his assertion that nearly all the soldiers on the prescribed and limited, but purin-containing diet, excreted uric acid of endogenous origin only, that is to say, reacted as if their diet had been purin-free. This seems intelligible on the recent theory of Kutscher and Seemann (1904), suggesting that, when occasion requires, uric acid may be anabolised into nuclein instead of the normal reverse process.

What now is the feature common to all these three peculiar dietaries, and shared to some degree by vegetarianism? Haig allows only purin-free diet, which is unattractive and mainly vegetable. Fletcher and Someren insist on a prohibitive duration of mastication. Chittenden simply limits the quantity of nitrogenous food to its lowest possible limit in healthy individuals. All three achieve wonderful results both in health and disease. Now, of necessity, all food reformers must startle the imagination of their disciples, but what trick is the conjurer really concealing when he fires the uric-acid pistol, or when he insists on inordinate mastication, or when only bulky vegetarian food is permitted? Surely a chief result of all these systems is that the *quantity* of nitrogenous food is diminished by an oblique method, which is most useful in dealing with many patients.¹

I do not mean to assert that a purin-free diet has no other virtue beyond automatically limiting the quantity of nitrogenous food consumed. In selected diseases mere limitation of quantity would not be enough.

The following diseases, for instance (commonly attributed to difficulties in nitrogenous metabolism), are sometimes cases in point: gout (specially with asthma or eczema), migraine, chronic rheumatism (genuine), in all its forms, lithæmia, biliousness, inadequacy of the liver or kidneys, and probably high blood pressure, arteriosclerosis and some forms of neurasthenia.

¹ Another common factor of unknown potency would be the sub-conscious effects of enthusiasm on metabolism.

Prize Essay.

HÆMOPHILIA.

By JOHN J. WILSON, M.D. (EDIN.).

History.—Authorities seem all to agree that the first authentic case reported is that recorded in the writings of an Arab called Albucasis, who died in Cordova in A.D. 1107. The next record of a case is that reported by Alexander Benedictus, in 1539. Virchow draws attention to a case recorded by Hochsetter, of Augsburg, in 1674. Legg,¹ in his treatise, notifies three cases, reports of which were published in the *Philosophical Transactions* in 1674. In 1784 Sir William Fordyce described a family, living in Northamptonshire, in which father, a daughter and sons were affected with the disease. The only other two cases mentioned about this time is one published in the *Medicinische Ephemeriden*² in 1793, and one by Rave in 1798. The next observer who takes note of the disease is the American physician Otto,³ who applied the term "Bleeders" to those who suffered from it. He describes a family in whom the disease could be traced back for 80 years. In 1813 Hay reports the Appleton-Swan family, which Legg says is a branch of the same family reported by Otto. The other cases reported in America are the Collins family by Buel,⁴ and a Pennsylvania family by Coats⁵ in 1828. The German physicians now took up the study of the disease, thanks to the paper on the subject by Nasse in 1820, then followed Wachsmuth with a report in 1849, Virchow in 1854, and in 1855 Grandidier published his now classical treatise. In France, Gavory published an account of the microscopical examination of the blood-vessels, and an analysis of the blood, and Simon wrote an article on the subject in 1874. In England, little notice of the disease seems to have been taken till Legg published his treatise in 1872; more lately, Sir William Jenner gave an account of the morbid anatomy of the joints. Legg has also further reported several individual

cases, with an account of the examination of the tissues and joints.

Symptoms.—According to Legg, Fagge, and others, the symptoms of the disease rarely manifest themselves during infancy, but both Virchow and Nasse maintain that it is a congenital disease, and shows itself from birth onwards. Numerous cases are recorded where children have died shortly after birth, as instance those reported by Macarthur,⁷ Vincent,⁸ Eagle,⁹ Jardine,¹⁰ and Roper.¹¹ The weight of evidence seems to point to the fact that the disease may be recognised as such, from birth onwards.

(1) *Premonitory Symptoms.*—These may be present, but in the majority of instances they are absent. Legg says he has never seen any. They are usually flushing of the skin, plethora of the face, throbbing of the temples, dyspnoea, headache, giddiness with irritability of temper, restlessness with disordered vision and hearing, accompanied with scanty secretion of urine. There are also spontaneous pains in the limbs and constipation. These premonitory symptoms often indicate the locality of hæmorrhage, as, for instance, pain in the back with hæmaturia, and irritability of the nose before epistaxis.

(2) *External Hæmorrhage.*—The most frequent seat of hæmorrhage, especially in children, is the mucous membrane of the nose. Grandidier gives an account of 256 cases, in which he shows that the most frequent site of hæmorrhage is the nose, with 122 cases, and the least frequent, the eyelids, with 1 case. Bleeding may arise spontaneously from any of the mucous surfaces, more frequently it is the result of some injury, such as the extraction of a tooth or the incision of the gum. Blood may ooze spontaneously, even from beneath the finger nail. Henschell reports death as having arisen from hæmorrhage after vaccination, and Hughes¹² relates the case of a family in whom the application of blisters caused death. The slightest abrasion of the skin may result in death from hæmorrhage. Jenner says the oozing is venous, but I have watched bleeding occur, and am of opinion that the blood is distinctly arterial. The bleeding is most persistent, and may defy all forms of treatment, and finally the patient dies of syncope. When the hæmorrhage ceases, the wound rapidly heals, but it may break down again and again.

(3) *Internal Hæmorrhage*.—In the majority of sufferers this form of hæmorrhage is very marked. The blood is extravasated beneath the skin, between muscles or into the muscular substance; more rarely into serous cavities. It is thrown out into regions which have not much support from fascia, or in those areas which are liable to injuries from exposure, such as the lower limbs, the shoulders. The face, however, escapes. Accompanying the formation of the blood tumour there is very severe pain, high temperature, and rapid pulse. The blood may escape slowly from the capillaries, but at times there is a rapid increase in the size of the tumour, as if some large blood-vessel had been ruptured. If the effusion takes place into the subcutaneous tissue, gangrene of the skin may occur, and the hæmorrhage becomes external. As a rule, absorption of the blood generally occurs, but occasionally calcification of the thrombus supervenes. Hæmorrhage may take place into the peritoneal or pleural cavities, and Immerman records four cases where the blood was extravasated into the meninges. A patient may at one period of his life be liable to attacks of bleeding, and at other times be exempt, even although he has received injuries sufficient to do him harm.

(4) *Arthritic Phenomena*.—The joint manifestations of the disease occur spontaneously, or as the result of a blow or strain. They consist of considerable swelling, accompanied by pain, stiffness, and slight rise of temperature. These are late symptoms, not occurring till seven or fourteen years of age. They may be the most marked sign of the disease, the hæmorrhage being only a secondary symptom. They occur in the joints which are most in use, the order being knee, hip, elbow, ankle, wrist, and shoulder. They rarely occur in the joints of the fingers or toes. The swelling and pain are most common in spring and autumn, especially if those seasons are cold and damp. Formerly the effused fluid was thought to be pure synovial secretion, but, as a result of post-mortem examinations, it has been ascertained that it is bloody, although there is no external discoloration of the skin to be seen. The swelling may be rapidly absorbed, or may persist for months, and may leave behind it permanent stiffness and inability to use the joint freely. Closely allied to these arthritic

phenomena are the frequent attacks of severe pains in the muscles of the trunk, and the patient may be quite prostrated by lumbago, which is hæmophilic in character. Internal or external hæmorrhage may alternate with these arthritic attacks.

ÆTIOLOGY.

(a) *Heredity*.—As an hereditary disease, hæmophilia is one of the most marked examples we know of, but the remarkable peculiarity of its hereditary character is that the female members of a family are practically always exempt, or it shows itself in them in a very modified form. Dr. Dunn has collected statistics of 256 families in which there are 770 cases, and Osler mentions the Appleton-Swan family, where there have been cases for two centuries, and it has now appeared in the seventh generation. The disease may be handed down from father to son, but the usual method of descent is through the female members of a family to their male descendants. A father bleeder may give rise to a son who is a bleeder, and to daughters who escape, but who in their turn give birth to sons who show the disease on them. It has been noted that direct transmission from a father's generation to a son's is more common where the father has not had the disease, but whose brothers have had it.

(b) *Sex*.—Closely related to heredity as an ætiological factor is the sex of members of a family. According to Dunn and Grandidier, the proportion of females to males affected in a hæmophilic family is as 1 to 11. Legg, however, says that this is too high. In females the disease is not so severe, and manifests itself as menorrhagia, or metrorrhagia. In a case reported to me a mother suffered from severe hæmorrhage for five months after giving birth to a child who died of exhaustion, shortly after birth, from subcutaneous hæmorrhage. Another peculiarity of female members of a hæmophilic family is, that they are more prolific than other women. The average number of children is nine, whereas the average in ordinary healthy families is five. In addition, there are generally more daughters than sons.

(c) *Age*.—The disease manifests itself most commonly during the first year of life, Legg maintains that it rarely occurs after the 12th year, but Grandidier quotes two cases of father

and son in which it showed itself as late as 21st and 22nd years of age.

(d) *Race*.—It seems to occur in all races, although most cases have been reported from Germany. It has been held that the Teutonic races show most cases, but there are just as many reported among Semitic families.

(e) *Climate*.—It occurs at all habitable altitudes, but cold and damp weather seems to predispose to attacks of hæmorrhage and joint manifestations.

(f) *Social Position*.—It shows itself in all classes of society. Generally patients are thin, having a nervous temperament, the skin is thin and transparent, the veins stand out prominently, the intellect is sharp, and the mental capacity above the average.

MORBID ANATOMY.

The morbid changes found after death are not numerous, but they may be classified under five heads.

(1) *Changes in the Heart*.—A number of peculiarities both in regard to the size and shape of the heart, have been recorded by different observers, and they may briefly be summed up as follows:—hypertrophy of the left ventricle,¹¹ thinness of the walls of the right ventricle, thinness of the inter-ventricular septum with in one case patency of the foramen ovale.

(2) *Changes in the Blood-Vessels*.—Blagden¹⁴ in 1817 was the first to draw attention to the transparent and thin nature of the blood-vessels. Virchow in 1857 found fatty degeneration of the fibres of the heart, and the aorta was narrow and of small calibre. The most important changes have been reported by Dr. Percy Kidd,¹⁵ in the case of a child, aged 6 years, who died from hæmorrhage from the gums. He found that the heart was fatty in the inner half of its wall, the aorta, iliac veins, and arteries were unusually thin. The epithelium of the mouth, taken from near the area of the bleeding, was less thick than usual, individual cells being indistinct, with no or very few nuclei. In the smaller blood-vessels there was marked proliferation of endothelial cells. In some of the blood-vessels there were few muscular fibres, and, when they were to be seen, the nuclei were undergoing subdivision. These changes do not occur in all cases, as Legg has reported

two cases in which no morbid appearances were to be observed.

(3) *Morbid Changes in the Blood.*—Wright has summarised the changes in the blood as follows:—

- (a) Reduced number of white blood corpuscles.
- (b) Diminished proportion of polynuclear leucocytes, 54 per cent. of the total number of leucocytes.
- (c) Apparently an altogether subnormal degree of coagulability (coagulation time 9 to 10 minutes, instead of 2 to 5 minutes).

The number of red corpuscles is practically normal.

(4) *Changes in the Joints.*—The changes in the joints are minutely described by Legg.¹⁸ In a joint, recently affected, there is a small amount of blood clot, without any structural change in the cartilage. In later cases, the synovial lining of the joint is of a deep russet-brown colour. The cartilage is thin, granular, and worn out, especially where there is pressure. The edges of the cartilage are ragged and fibrous, and split into layers similar to the condition found in chronic rheumatic arthritis. Around the joint the bone becomes lipped and nodular, and is thinly covered with cartilage. On microscopic examination, the cartilage is found to be undergoing fibroid degeneration, with multiplication of cells.

(5) *Thymus Gland.*—In many cases the thymus seems to persist to a much later period of life than usual. Virchow performed a post-mortem examination on a man of 24 in whom the thymus remained large. Legg reports persistence in a boy of 14. Acland¹⁹ gives an account of very marked changes in the gland, in the case of a child of 7. There were rounded apparently spherical masses so large as to be readily visible to the naked eye. In some cases they were related to the corpuscles of Hassell, and in others surrounded by a blood-vessel. The gland was very large for a child of seven.

PATHOLOGY.

Many theories have been advanced as to the causation of the disease, but we must come to the conclusion that it is one affecting the whole vascular system, the blood-vessels, and the blood, for, as Woolridge²⁰ has said, "the blood and the vascular wall may be looked upon as a protoplasmic unit." The minute

changes described by Kidd may be taken as a type of the disease, in which there is undoubted thinness of the blood-vessels and a consequent friability and liability to hæmorrhage, along with this there is a friability of both muscular and subcutaneous tissues, as the effused blood seems to plough up those tissues very readily. Along with these morbid states of the vessels, there is, as Wright has shown, a low power of coagulability of the blood. Woolridge has shown that coagulation may be due to the interaction of "fibrinogens" of the blood, as he calls them. "The processes of coagulation are the result of the union in definite proportions of complex proteid lecithin compounds." May it not be that the blood cause of the disease may be the absence of some of these substances?

There is a number of questions which we may ask ourselves, which, if investigations were made, might throw more light on the causation of the disease. Does the thymus remain of abnormal size in all cases, and, if so, has its late persistence any significance? Is it simply a lymph gland, or has its secretion to do with the development and upkeep of the vascular system, as the thyroid has to do in the case of the nervous system?

TREATMENT.

In considering the preventive treatment, we are faced by the fact that the disease is a hereditary one. We should endeavour to persuade members of families, in which hæmophilia exists, not to marry. As an example of the efficacy of this means of prevention, it is related by Fagge, that among two families in Tenna hæmophilia had been known to exist for about a century. In 1855, the female members resolved not to marry, and in 1879 there were no well-marked cases in the community. Patients should be taken great care of, and not allowed to play boisterous games. School teachers should be warned not to strike children. Extraction of teeth should be avoided, if possible. When manhood has been reached, the employment should be a sedentary one. Residence should be in a warm climate, avoiding a damp atmosphere. Diet should be light, with plenty of fresh vegetables, and alcoholic liquors should be avoided, especially if there are prodromata. For the joint affections, rest, pressure, and afterwards counter-

irritation should be employed. If external hæmorrhage arises, absolute rest should be insisted on, along with pressure on the bleeding point. All known styptics have been employed, among others, ice, tannic acid and gallic acid, perchloride of iron. Adrenalin chloride should be applied, being a newer remedy. Wright recommends a solution of fibrin ferment along with chloride of calcium. If all these fail, cauterise with the actual cautery.

If the hæmorrhage is internal in character, it generally subsides spontaneously, but morphia is often required to relieve the pain. If the hypodermic needle is used, it is advisable to inject near the seat of hæmorrhage where the tissues are cedematous, as I have seen blood tumours form on the forearm after the use of the needle. Ergot, digitalis, perchloride of iron, sulphate of soda, and sulphate of magnesia have all their advocates as a preventive, and should certainly be tried. Calcium chloride is recommended by Wright, and is of service, as it increases the coagulability of the blood. During convalescence, iron and arsenic should be prescribed.

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THE TREATMENT OF VENEREAL DISEASES IN THE SERVICES.

By MAJOR F. J. W. PORTER, D.S.O., R.A.M.C.

IN the article on the treatment of venereal diseases in *THE PRACTITIONER* for September, Dr. Randall states that, "as compared with the navy, the condition of the army is in no better case." Two or three years ago this statement would have been perfectly correct; but things have altered for the better since then. As the system at present in vogue may not be generally known, I will endeavour to describe it.

In the good old days, every case of venereal sore was diagnosed according to the ideas of individual medical officers. If one thought, from the appearance of the sore, that it was primary syphilis, he diagnosed it as such. The result was, that very often a man had six or seven entries for primary syphilis on his medical history sheet, and no entry of secondary disease. On the other hand, entries of secondary syphilis often appeared without record of primary disease. In neither case did he obtain any treatment or supervision after his discharge from hospital. This has now been altered. At the present time every man who is admitted to hospital with a venereal sore is diagnosed venereal sore, "V.S.," provisionally.

When he is discharged from hospital, a notice is sent to his commanding officer to the effect that the man was discharged on a certain date, and that he is to be kept under surveillance by the medical officer in charge of his regiment for two months. His medical history sheet is marked "V.S." in pencil. He is seen once a week by the medical officer for two months, and at the end of that time, if he has developed no rash, intimation is sent to the military hospital that he is to be diagnosed soft chancre. This is entered on his medical history sheet, and the man is released from further surveillance. If a rash develops, he is diagnosed syphilis, and comes under continuous treatment for at least two years. At the time of the diagnosis of syphilis, a "syphilis case sheet" is made out for him according to the attached form, and weekly entries are made on it. His name is also entered in the syphilis register

of the military hospital, and he is assigned a number. Copy of syphilis register attached.

If the man leaves the station, even temporarily, his syphilis case sheet, or surveillance form, is sent to the place to which he has gone, and, in the former case, he is entered on the syphilis register of that hospital as a transfer. In this way he cannot escape from treatment; and, if a man contracts the disease during the early part of his service, there is every possibility of his becoming cured before he leaves it. The same cannot, of course, be said for the man who contracts the disease within the latter months of his service. The system of treatment at the station where I am at present serving, viz., Colchester, is as follows:—The garrison is a large one, consisting of four infantry battalions, one cavalry regiment, three batteries of artillery, details of A.S.C., R.E., A.O.C., R.A.M.C., &c. The actual medical charge of the troops in barracks is carried out by three medical officers, and to these used to fall the duty of surveillance and continuous treatment of syphilis. Owing to the constant moving of medical officers, which is unavoidable at headquarters stations, it was practically impossible to keep touch with the cases. The men were also being constantly seen by fresh medical officers, with different views on the subject of the treatment of syphilis, and, altogether, things were satisfactory neither to patients nor medical officers. I joined this station on March 1 last as operating surgeon to the military hospital, and was given the medical charge of two infantry battalions, company of Royal Engineers, and the military prison, in addition to hospital duties.

As I was very much interested in the treatment of syphilis by intramuscular injections, and, from my position, not likely to be moved about, I asked that the treatment of the whole of the syphilis cases in the garrison might be handed over to me, and that I might also see all the cases which were under surveillance. This was done, and the syphilis case sheets were collected from the other medical officers and handed to me. I examined the men, and eliminated those who I thought had been under treatment long enough, and who showed no signs of the disease. This left about 60.

I then took over charge of the ward in which all venereal sores are treated. I make it an invariable rule, never to give

mercury until I see the earliest rash. The men know perfectly well that some sores are followed by syphilis, and others not, and they much prefer to have it demonstrated quite clearly to them that they have the disease, before they are started on a two-years' course of continuous treatment. I quite admit that it is possible in a large number of cases to say, from the appearance of the sore, that secondary symptoms will follow, but one can never be quite certain. I have seen two cases of phagadæna lying side by side. The same treatment was adopted in both cases, and yet one developed secondary symptoms and the other did not. I cannot say that I have ever seen any ill results from so waiting. These men all become well known to me, and after their discharge, I see them weekly for two months *from the date of their admission to hospital*. If at the end of that time they have not developed any eruption, they are diagnosed "V.S." and released from further surveillance. The cases of syphilis attend once a week at the military hospital, a notice requiring their attendance having been previously sent to their commanding officer.

At the first the men showed some signs of unwillingness to attend, but they soon saw that they were going to be seen regularly by an officer who took a great interest in their individual cases, and they quickly submitted to the inevitable. I showed them one or two cases in which great disfigurement had resulted from want of continuous treatment. Out of the lot, two men absolutely refused treatment by injection. I at once arranged with their commanding officer that these men were to attend at the military hospital twice daily, *in their own time*, and have a powder of Hydrarg. c. Creta and Pulv. Doveri dropped into their mouths. They stuck manfully to this line of treatment for about a month, and then gave in. One man asked me if I could give him the injection under cocaine, so it was obvious that fear of the needle-prick accounted for his refusal.

A register is kept by me in which every man has a separate page. At first, every man comes up weekly. His symptoms and the condition of his gums are noted; and, if the latter are sound, his name is noted for an injection, and he stands on one side. When every one has been seen, the men stand on chairs by fours, with their backs to a good light. An all-glass syringe,

holding 20 minims is filled, and a number of cotton-wool swabs wrung out of 1 to 20 carbolic are prepared. The needle is well rubbed on a swab, and a place having been selected *high up near the crest of the ilium*, it is quickly pushed up to the hilt in a vertical direction, *i.e.*, parallel to the long axis of the body. The piston is then pushed down until 5 minims have been injected, and the needle quickly withdrawn. It is then thoroughly rubbed through the swab, which has been turned over, inserted into the next man, and so on until the syringe is empty. Occasionally a superficial vein is pricked, but pressure for a few minutes by a swab always stops it. I never sterilise the skin of the patient, nor treat the needle in any other way, and, after giving many thousands of injections, I have never had an abscess nor any other accident. I know that some people rub the skin at the proposed site of injection with a swab soaked in 1 to 20 carbolic acid, but I prefer to push the perfectly clean needle through dry skin, than through skin which has been rendered sodden, and has not really been sterilised.

By introducing the injections at the above site, men never complain of difficulty in sitting down, and cavalry soldiers perform all their duties without complaint. I inject the buttocks alternately, and avoid the site of previous punctures. Since March 31 last, I have given 704 injections. I use the following prescription :—

Pure Mercury	-	-	-	3 ij.
Lanolin	-	-	-	3 ij.
Olive Oil	-	-	-	3 iv.

Dose, 5 minims.

I find that most men take 10 continuous weekly injections without their gums getting touched, but occasionally one meets with a man who is intolerant of mercury, and cannot take so many. At the end of the 10th injection, the man is invariably quite free from any manifestation of the disease. His name is put on the monthly list, and he comes up for inspection at the end of that period. His name is then turned up in the register; his gums, throat, body, and anus are examined, and a note made if he is still free. His weight is also taken. If he is found to have any fresh manifestation he is again transferred to the weekly list. Very rarely it is found necessary to take a man into hospital for treatment, and in these cases forced abstinence from tobacco and liquor,

together with gargles and mouth-washes and a generous diet, soon bring about an early discharge from hospital. Every entry in my register is transcribed by a clerk next day to the man's syphilis case sheet.

No further injection is given for three months. At the end of this time, if the gums are healthy, a further course of five weekly injections is given. Four months from the termination of this course, a further course of five injections. The next course after an interval of five months; and so on, until two years have elapsed.

The method of treating cases of syphilis by intramuscular injections was introduced into the British Army about 1891 by Lieut.-Col. F. J. Lambkin, R.A.M.C., and his first paper, based on 1,000 injections, was published in the A.M.S. Reports. This officer has never ceased to advocate this method, and, at the present time, it is the most popular means of treating syphilis in the army. Without it, continuous treatment would be a practical impossibility. Men cannot be spared from their ordinary duties to come up twice daily for medicine. Even if they could, the amount of extra labour, in the shape of dispensing, would be enormous. It is well known that soldiers cannot be trusted to take medicine which is given to them, once all outward manifestations of the disease have disappeared.

This method of treatment would have become more rapidly popular with Army Medical Officers, had proper syringes and well-made injection been supplied from the first. Carried out on the lines which I have above indicated, there is very little extra work connected with it, and, although I have at present 90 men on my venereal list, it rarely takes up more than three-quarters of an hour of my time once a week. There appears to me to be no reason why the present army system should not be adopted by the navy, and lead to a very great improvement in the present venereal statistics of that force. As regards the treatment of gonorrhœa in the army, there is no doubt that the present method of discharging to duty every case as soon as "he has been dry" for a week, is very unsound, and is calculated to spread the disease amongst the civil population. At the Herbert Hospital, Woolwich, no case is discharged hospital until he has been proved to be microscopically free from the gonococcus. If this method were adopted all through the service much benefit must ensue.

Army Form I. 1239.

RETURN OF A SOLDIER UNDER MEDICAL SURVEILLANCE
FOR VENEREAL DISEASE.

Corps	Com- pany.	Regi- mental No.	Rank and Name.	Remarks.

To _____

Station and date _____

The Officer who places the man under surveillance will prepare this form in duplicate. One copy will be forwarded to the Officer Commanding, and the other to the Medical Officer who will have the surveillance of the man. When a man under surveillance is transferred to another station, the Commanding Officer will apprise the Medical Officer of the fact.

Army Form I. 1238.

SYPHILIS CASE SHEET.

Serial number in register _____ Station _____

Regtl. No. _____ Rank and name. } _____ Corps _____

(1.) Probable date and place of infection _____

(2.) Date of appearance of sore _____

(3.) Character of sore _____

(4.) Treatment (if any) before being placed on the Syphilis Register _____

(5.) Date of being placed on the Syphilis Register _____

(6.) Condition at that time as regards :—Weight _____

Urine

Skin

Mucous membranes

Lymphatic glands

Other symptoms _____

Treatment and progress. (The weight should be noted at regular intervals, any constant decrease being an indication to suspend treatment. Changes of station, re-admissions to hospital, and alterations of treatment, with dates, should be noted. The dates and doses of mercurial injections should be given.)

Date.

Date.	
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THE VALUE OF HAFFKINE'S PROPHYLACTIC IN PLAGUE.

By W. J. SIMPSON, M.D., F.R.C.P.,

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THE prophylactic discovered by Haffkine has now been known to the medical world for about eight years, and during that period, in consequence of the spread of plague, there have been ample opportunities for testing its efficacy. It was first tried at the Byculla House of Correction in January, 1897, when the results, there obtained, enabled Haffkine to arrive at some very important provisional conclusions. These were, (1) that one injection of 3 c.c.s of the prophylactic is sufficient to protect during an existing epidemic; (2) that inoculation is powerless to arrest the disease in those in whom the symptoms have already appeared, or which develop within a few hours; (3) that the inoculation mitigates, or aborts, the disease in those who are in the inoculation stage, and who were infected three or four days previously; (4) that the prophylactic, unlike other vaccines for cholera, rabies, anthrax, or small-pox, exercises its protective effect in less than 24 hours, acting, in this respect, with a rapidity which is only known in antitoxic sera.

These conclusions were very remarkable, because of their apparent opposition to many preconceived notions, and because of the doubts excited as to their validity. Later observations have, however, fully confirmed Haffkine's conclusions, which absolutely stand to-day without modification. The importance of these conclusions is that on their accuracy largely rests the value of the inoculations.

The view that the toxic material, contained in the prophylactic, added to the toxines, already being generated by the plague microbe in the infected body, would not aggravate or intensify the disease which was incubating, was too paradoxical to be readily accepted. That such was possible, Pasteur had proved in his treatment of rabies. But, both in

India and elsewhere, it was difficult to accept this view in reference to plague, and the most general objection urged against the plague prophylactic, was the risk which it would likely cause in persons incubating the disease. It was an objection which tended, in a very strong degree, to hinder the progress of the inoculations. For if the prophylactic, instead of being capable of mitigating, or aborting, the disease in the incubation stage, as was maintained by Haffkine, increased the risk of death among those incubating the disease, it would be impossible to apply the prophylactic during an epidemic, the time, of all others, when the inhabitants are most willing to subject themselves to preventive treatment. It is not generally before an epidemic that the inhabitants can be induced to avail themselves of the protective effect of a prophylactic. Of the large number of persons, who present themselves during an epidemic for prophylactic treatment, many must necessarily be in the incubative stage. It is, therefore, of the highest importance that the prophylactic shall not be injurious to them, and, if possible, that it shall mitigate, or abort, the disease incubating in them. As it is precisely on these two points that the Indian Plague Commission, and the Oporto Commission, have controverted Haffkine's view, it is necessary, in order to estimate the value of the prophylactic, that they should be carefully considered.

The Indian Plague Commission, while accepting the facts which proved the general protective effect of the prophylactic, were indisposed to follow Haffkine in his conclusion as to protection in the incubation stage. They recorded their opinion that, "in view of the short incubation period of plague, and in view of the fact that our experience in the case of other diseases, both in animals and man, indicates that protection is not at all rapidly established, it seems to us unlikely that the anti-plague inoculation can exert any favourable influence on persons who are already incubating plague."¹ Further facts laid before them appear, however, to have somewhat modified their view, for, in the conclusion to their Report, they state that "inoculation does not appear to confer any great degree of protection within the first days after the inoculation has been performed."²

¹ *Report of the Indian Plague Commission*, Vol. V., p. 256.

² *Ibid.*, p. 262.

Calmette and the Oporto International Commission went still further, for they demonstrated, by actual experiment on mice, that Haffkine's prophylactic rendered these animals immune only after an elapse of 8 to 10 days, and that the prophylactic, given simultaneously with a small and feeble dose of the plague virus, increased the virulence of the disease, rendering death certain even in cases in which there might otherwise be a percentage of recoveries.

Calmette and Salimbeni, in their report, conclude that "it is certain that after injection of the prophylactic, and until the immunity it confers is established, that is to say, during 8 to 10 days after the vaccinal injection (as always exists after active immunisation by living microbes or by their toxins) the organism is, for the time being, sensitive to an infection even very slight."¹

When persons who have been, or are to be, exposed to plague infection are to be inoculated, on account of the danger accompanying the use of Haffkine's prophylactic, during the first 8 or 10 days after inoculation, it is recommended that they shall be inoculated with a mixture of it and Yersin's serum, instead of with Haffkine's prophylactic alone, the serum to produce a rapid immunity and counteract the injurious effect of the former prophylactic.

It is evident, from this recommendation, that the observations and conclusions, resulting from the experiments on mice, have been considered to be applicable to man. Calmette's views, being based on experimental evidence, have met with general acceptance. Following these experiments, it has been generally held that Haffkine's prophylactic takes some 8 to 10 days to immunise, and that it increases the virulence of the disease in persons inoculated while incubating plague. As will be shown later, these views are quite unfounded. The deduction, that what applies to mice in the laboratory under the conditions of injection of cultures of the plague bacillus, applies also to man in Nature's laboratory, and under conditions in which the mode of infection is still a matter of theory, happens in this case to be incorrect and misleading.

The application to man of conclusions which are applicable

¹ *Annales de l'Institut Pasteur*, No. 12, 1899.

to mice has tended, in no small degree, to check the free use of Haffkine's plague prophylactic in places and at times when the best preventive policy would have been to push on the inoculations. For, during an epidemic, few, if they think there is a risk of increasing the virulence of the disease in the inoculated population, for about 8 days after the inoculation, would care to carry out a vigorous campaign of inoculations in infected houses and infected areas, the places where the inoculations are most acceptable. In doing so, numbers of persons already infected, and those likely to be infected during the next 8 or 10 days, would unavoidably be sacrificed, if Calmette's views were correct.

The effect of these views is to be seen in many of the instructions issued regarding inoculation with Haffkine's prophylactic, when these inoculations are recommended to be carried out only in the absence of plague, and for Yersin's serum to be used when plague breaks out. Such instructions are tantamount to the prohibition of Haffkine's prophylactic in an infected district during a plague epidemic, while the serum plan, under these conditions, is obviously impracticable. For the effect of the serum inoculation only lasts a fortnight at the most, and would necessitate frequent re-inoculations of the population. Further the serum, which requires some six months for its preparation, is extremely expensive, and is not obtainable in sufficient quantities for one series of inoculations of a large number of people.

It is not from observations on animals, but from observations on man, that the question as to the action of Haffkine's prophylactic has to be judged. This test has been applied in many places, but by far the most valuable record is that which the Punjaub in India supplies. In that province, plague has existed since 1897, and, from the commencement of the disease, inoculations have been carried out, more or less, among the inhabitants. The observations from 1897-1900 were on a small scale, but they were so definite in their results that they led to further inoculations on a large scale in the subsequent years. An admirable account of the inoculations carried out in the Punjaub from October, 1900, to September 30, 1903, is given by Major E. Wilkinson, I.M.S.,

in his three reports on the subject.¹ Each of these reports covers a year's work, and each represents a distinct period in the stage of the inoculation. The first period, from October to September, 1900, is one in which the inoculations are advocated by the officials, such advocacy having been started by the Commissioner of Banga. The second period, from October, 1901, to September 30, 1902, is marked by no official pressure being exercised in favour of the inoculations, but by the people themselves, who by deputation, or in writing, asked the officials to inoculate them. This eagerness for inoculation on the part of the inhabitants suggested further possibilities; and the third period, from October, 1902, to September 30, 1903, is distinguished by the attempt on the part of the Punjab Government to carry out a scheme of inoculation on a large scale in the infected districts. It is not necessary to deal here with any of the details of the scheme of 1902-1903. The chief interest lies in the fact, that by a prolonged experiment, extending from October, 1900, to September 30, 1903, data were obtained from which definite conclusions relating to the efficacy, harmlessness, and rapidity of protection of Haffkine's prophylactic can be arrived at.

197,278 persons are recorded to have been inoculated in the first period, from 1900-1901; 318,565 in the second period, from 1901-1902, and 505,849 in the third period, from 1902-1903, making a total of over a million in the three years. If to these be added the inoculations made during the first three years, from 1897-1900, which amounted to 306,730, there is a grand total of 1,328,422 persons inoculated. The results of an experiment, which included over a million and a quarter inoculations, and which was carried out on man under his ordinary conditions of life, are invaluable. The conclusions, deducible from the observations of the effect of the prophylactic

¹ *Report on Inoculation in the Plague-infected Areas of the Punjab and its Dependencies.* From October, 1900, to September, 1901. By Major E. Wilkinson, F.R.C.S. (Eng.), D.P.H. (Camb.), I.M.S., Chief Plague Officer, Punjab, 1903. *Report on Plague in the Punjab.* From October 1, 1901, to September 30, 1902. Being the fifth season of Plague in the Province. By Major E. Wilkinson, F.R.C.S. (Eng.), D.P.H. (Camb.), I.M.S., Chief Plague Medical Officer, Punjab. *Report on Plague and Inoculations in the Punjab.* From October 1, 1902, to September 30, 1903. Being the sixth season of Plague in the Province. By Major E. Wilkinson, F.R.C.S. (Eng.), D.P.H. (Camb.), I.M.S., Chief Plague Medical Officer, Punjab.

on man, must stand, although they may be contrary to those founded on experiments on small animals in the laboratory, and opposed to what preconceived notions may have expected.

The conclusions as to protection derived from this large experiment, or series of experiments, on man may now be considered. To begin with, a comparison of the case mortality of the uninoculated with that of the inoculated, when each class is attacked with plague, shows that the advantage is greatly on the side of the inoculated. If the first three years, from 1897-1900, are taken, when the inoculations were performed on a smaller scale as regards area, and with an organisation for collecting data, it appears that the case mortality for the uninoculated was 60·99 per cent., whereas it was 36·55 per cent. for the inoculated, or a diminution of 24·44 per cent. in favour of the inoculated. For the next two years, 1900-1901, and 1901-1902, in consequence of the incompleteness of the organisation for collecting the results, the data for comparing the incidence of outbreaks of plague upon inoculated and non-inoculated communities, living under similar conditions, were not obtainable, except in a few instances. Such data that were available showed that, in 1900-1901, the case mortality for the uninoculated was 60·59 per cent., and for the inoculated 36·50 per cent., while, in 1901-1902, the case mortality for the uninoculated was 65·14 per cent., and among the inoculated 35·07 per cent. The most accurate observations were, however, made in the year 1902-1903, when there was a special organisation for plague inoculations. In that year, it was ascertained that the case mortality among the uninoculated was 60·1 per cent., and among the inoculated 23·9 per cent. These figures prove the strong protection against death that the inoculated possess compared with the uninoculated.

The harmlessness of the prophylactic, and the rapidity of its protective powers, will be next considered. Taking first the observations made in the great scheme of 1902-1903, a comparison of the mortality of the uninoculated with that of the inoculated shows that, among the uninoculated, there were 193,804 deaths in 320,454 cases of plague, or a ratio of deaths to attacks of 1 to 1·65. Among the inoculated, 48 deaths were observed in 70 cases on the first day after inoculation, or a ratio of 1 to 1·48; on the second day after the inoculation, there were 24 deaths in 50 cases, or a ratio of 1 to 2·1; on the third

day after inoculation there were 20 deaths in 59 cases, or a ratio of 1 to 2.9. Thus, during the first three days after inoculation, there were 92 deaths in 179 cases, or a ratio of 1 to 1.96. On the first day after inoculation, there was a slight difference in favour of the inoculated, but already from the second day the inoculated were less liable to death than the uninoculated. This advantage continued to increase. During the second month after inoculation, it reached a ratio of 1 to 4.6, during the third month, it was 1 to 4.5, during the fourth month, 1 to 4.6, and, subsequent to this, it was 1 to 3.5 up to the end of the year of the report. The average for the whole period was 1 to 3.96, as against 1 to 1.65 in the uninoculated.

For 1900-1901, the ratio of deaths to attacks among the uninoculated was 1 to 1.69, whereas among the inoculated it was 0 to 1 on the first day after inoculation; 1 to 2 on the second day after inoculation, and again 1 to 2 on the third day after inoculation; during the fourth month after inoculation the rate was 1 to 3.18, and subsequent to this it was 1 to 2.61. For the total period the ratio was 1 to 2.75 among the inoculated against 1.69 in the uninoculated.

For 1901-1902, the ratio of deaths to attacks among the uninoculated was 1 to 1.54. Among the inoculated the first three days are grouped together, the ratio being 1 to 1.58. By the fourth month, the ratio of deaths to attacks among the inoculated was 1 to 4.73, and, for the whole period, the average was 1 to 2.85, as against 1 to 1.54 in the inoculated.

These results completely negative the prevailing view that Haffkine's prophylactic is dangerous for 8 to 10 days after inoculation, should the person inoculated be exposed to infection during that period, or be incubating plague at the time of inoculation. On the contrary, they show that there is a considerable protective effect on the second day after inoculation, and that the relative immunity continues over four months. Probably further observations will demonstrate that the immunity is as lasting as that produced by the cholera inoculations, which proved to be effective for about two years.

If Haffkine's prophylactic is now considered, from a practical point of view, as to its value in saving life, it will be found that the data, which the Punjab campaign of 1902-1903 furnishes, supply overwhelming proof of its being the most powerful measure against a prevailing epidemic of plague, that a properly

organised, adequate, and efficient sanitary service can employ in India.

There are other powerful measures to be adopted, but there is little doubt that this deserves to be in the first rank. In the campaign of 1902-1903, 505,849 persons were inoculated. Major Wilkinson gives a table in his report of that year, analysing the protection afforded on 224,428 inoculated. From this table, it appears that in this number inoculated there were 7,866 lives saved from plague. Of the 224,428 inoculated the average number exposed throughout the epidemic was 186,797, while the average uninoculated, with whom the inoculated were living in the same villages, was 639,630.

The 639,630 persons inoculated had 29,723 deaths. The 186,797 persons inoculated should have had proportionately 8,680 deaths, but had only 814. This prevention of 7,866 calculated possible deaths out of 8,680, or 90.62 per cent., may be fairly attributed to the effect of the inoculations, *i.e.*, 7,866 lives out of 8,680, or 90.62 per cent., were saved by inoculation.

The total inoculated during the campaign was in September, 1902, 24,268, and from 1st of October, 1902, to the end of September, 1903, 481,581, making a total of 505,849. Of these, 360,408 are recorded to have lived in 5,260 infected villages, in which a total of 195,141 deaths occurred. Of these deaths, 1,337 were among the inoculated. Upon the basis of 90.62 per cent. saved by inoculation, the 1,337 actual deaths in the inoculated would have reached 14,254, *i.e.*, there were 12,917 lives saved among the 360,408 inoculated. The degree of exposure of the remaining 145,441 inoculated is not recorded, and it is consequently impossible to estimate to what extent life may have been saved.

The above data render it possible, however, to form an idea as to the proportions to which the Punjab epidemic of 1902-1903, with its 195,141 deaths from plague, might have been reduced, if the whole of the population exposed to infection had been inoculated. Of the 195,141 deaths, 193,804 occurred among the uninoculated. According to the above calculation, this number would have been reduced, through inoculation, by 90.62 per cent., or there would have been 175,629 less deaths. The epidemic would thus have caused, not 195,141 deaths, but 19,512, *i.e.*, less than one-tenth of the actual mortality.

BY-PATHS OF MEDICINE.

SOME MEDICAL WORTHIES OF BATH.

I.

THE fame of Bath as a watering place has for centuries gathered numbers of priests of Hygeia eager to minister at the shrine of healing. Several of these have been men of considerable celebrity in their day, and a brief account of them may be of interest. Of the early physicians of the place renowned as the seat of what a seventeenth-century writer calls the "Metropolitan Waters of all England" we get glimpses from a curious little book by Thomas Guidott, M.B., bearing date 1677, and entitled "The Lives and Character of the Physicians of Bathe from the year MDXCVIII to this present year MDCLXXVI in which Within the compass of Fourscore Years is comprehended great part of the Lives of XVII Physicians, which confirms the words of *Hippocrates* in his first *Aphorism* : *Ars Longa, Vita Brevis*." In his preface, the author, after premising that the office of a biographer, however faithfully discharged, is often a thankless one, proceeds : "Yet I have adventured to give in the following Papers a brief account of some particulars relating to the Physicians of Bathe with all the truth and candour that I can ; and if my Expressions, which I have smoothed what I may, in a few places seem to grate and bear hard upon some, I would have those consider that shall take exception at it, that 'tis not my fault I had not better matter ; and if I have proceeded as near as I could according to the Subject, as I'm sure is done, it will appear that I have not industriously abused the dead, or distasted the living, but used distributive justice, in giving every one his due." Guidott evidently believed in dealing as faithfully with the subject of his pen as Cromwell wished to be treated by the limner's pencil ; indeed, he took particular pains to bring out the warts. The consciousness of his virtue in this regard made him hold himself up as an example to other biographers. Thus he says : "This may also encourage others that have the like opportunity to do the same, that so those modest Meal-mouths, that think it too great an honour to publish any-thing in their own time (whereby I am persuaded Learning hath been more

injured than by any one thing whatsoever, good Copies by this means falling afterwards into the hands of corrupt and illiterate persons) may not want their just condemnation ; and those that keep their own breath, as we say, to cool their Pottage in a Chimney-corner, may have this good use of another mans."

Guidott begins with a general tribute to the excellence of the physicians of Bath, "both in regard they have been as eminent as any, I think, in any part of England, and also for the most part have been continued in a Series of Judicious, able men, well qualified and graduated in Universities, which deserve the greatest and most particular mention here." He complains, however, that only one or two have written concerning that which best deserved their consideration, namely, the nature of the waters ; but as this gave the worthy Guidott the opportunity of supplying the omission, the complaint need not be taken very seriously.

Guidott, it may be gathered, did not carry his researches into the earlier medical history of Bath very far, for the first physician he could "meet with any remembrance of" was one Reuben Sherwood, and of him he can tell us nothing more than that he died in 1598. Yet, without including John Phreas, a learned physician born in London at the end of the 14th or the beginning of the 15th century, who was made Bishop of Bath and Wells, the Bath waters had already found a sacred bard in William Turner, a physician of great note in the 16th century. He was a Cambridge man, a fellow student of Ridley the Reformer, and himself an ardent preacher of the new doctrines. Anthony Wood gives the following character sketch of him :—

"This person, who was very conceited of his own worth, hot-headed, a busybody, and much addicted to the opinions of Luther, would need in the height of his study of physic turn Theologist, but always refused the usual ceremonies to be observed in order to his being made Priest : and whether he had orders conferred upon according to the R. Cath. manner, appears not. Sure it is, that while he was a young man, he went, unsent for, through many parts of the nation, and preached the word of God, not only in towns and villages, but also in cities." For this Turner suffered imprisonment at the hands of Gardiner. On his release he went abroad and took the degree of Doctor of Medicine at Ferrara. Returning to England in the

reign of Edward VI., he became prebend of York, Canon of Windsor and Dean of Wells. These ecclesiastical dignities did not prevent his pursuing the practice of his original profession. He was incorporated Doctor of Physic of Oxford, and was appointed physician to the Protector, Edward, Duke of Somerset, a position which brought him considerable practice among people of rank. To Turner we owe the first Herbal written in English ; it was printed in London in 1551. It is not clear whether Turner practised as a physician at Bath, but he claims to be the first who wrote on its waters. He was, as has been said, Dean of Wells, and that may have given him a special interest in Bath. His folio volume, entitled *A book of the nature and properties of Bathes in England and of other Bathes in Germany and Italy*, was printed at Cologne in 1562, but the preface, which is addressed to his "well-beloved neighbours in Bath, Bristol, Wells, Wynsam and Charde," is dated from Basle, March 10th, 1557. He complains of the neglect of those who had charge of the Bath waters and of the lack of proper arrangements for the use of them by the sick. Another old work on the Bath waters, entitled *The rare Treasures of English Bathes*, and bearing date in 1587, is said to be "gathered and set forth for the benefit of the poorer sort of people by William Bremer, practitioner in physic and chirurgerie."

Another old Bath physician, of whom Guidott makes no mention, is John Jones, a Welshman, who took a medical degree at Cambridge and acquired a reputation as a practitioner at Bath and other places. He was the author of *The bathes of Bath's ayde, wonderful and most excellent against very many sicknesses*, published in London in 1572. There is prefixed an address to "his friends, kinsfolk, and allies of Bath, Bristol, Wells and other neighbouring places." Jones says he is the second medical writer who referred to these waters, Turner having been the first. Turner, however, makes no allusion to drinking the waters, while Jones lays down rules for the internal, as well as the outward, use of them. He recommends that persons of a hot temperament, weak and thin, should stay in the bath from 5 to 6 in the morning, and an equal period of time in the evening ; for those of a contrary habit, he enjoins two hours in the morning and an hour and a half in the evening.

To return to our guide, we find that another Dr. Sherwood, whose Christian name was John, a graduate of Cambridge, died at Bath in 1620; of him Guidott "can learn nothing more observable than that he was of the *Romish* religion, and a good Housekeeper."

One of the old medical worthies of Bath best known to fame is Edward Jorden, of whom Guidott says that he was "the first Physician that writ anything of the Waters that resided in the place." He was born in Kent in 1569, and educated at Oxford, and afterwards abroad. He got his doctor's degree from the University of Padua, and on his return home practised in London, and became a member of what Guidott calls "The King's Colledge of Physicians there." After a time, he settled at Bath, where he acquired the reputation of "a Learned, Candid and Sober Physician." He had a natural bent towards chemistry, and embarked on the manufacture of alum by a process of his own. The patent, which he had obtained from King James the First, was, however, revoked, and the monopoly granted to a courtier, Sir Arthur Ingram. By this Jorden was much damaged in his estate, and in his *Discourse of Natural Bathes and Mineral Waters* he refers to the matter as follows:—"Now I come to Allum (*Indignum vox ipsa jubet renovare dolorem*) the greatest debtor I have, and I the greatest benefactor to it, as should appear when I think fit to publish the artifice thereof." In his book, which was printed at London in 1631, he says he cannot commend the internal use of the Bath waters as much as it deserves, because of their adulteration in the baths wherein they are received. When taken internally, he recommends that they shall be drunk hot as they are pumped. He does not credit them with any purgative property, and observing that it was the custom of the guides to give them with that object, mixed with salt, he ascribes the effect to that substance alone. From what he says, it may be gathered that in Jorden's day the waters were used in the making of beer and broths. As regards bathing, he recommends that the patient should remain an hour or less in a hot bath and two hours in a temperate one. According to Guidott, Jorden lived at Bath many years.

"His conversation was so sweet, his carriage so obliging, and his life so answerable to the port and dignity of the faculty he profest, that he had the applause of the Learned

the respect of the Rich, the prayers of the Poor, and the love of all. But living a studious and sedentary life, which might encourage his two grand distempers he labours under, the Stone and Gout, departed this life in the great Climacterical year of his age 63, and of our Saviours Nativity 1632, lying buried in the South Isle of the Abbey Church, but without a Monument or any Inscription."

Another celebrated Bath physician was Tobias Venner, who was born near Bridgewater in 1577, and educated at Oxford. After taking a degree in Arts, he entered on the physic line, and practised for a time about Oxford. He took his doctor's degree in 1613, and, after practising for some time in his native place, settled in Bath. There he lived many years, having, we learn from Guidott, "*The Name of a plain, charitable Physician, but no ready man at stating a Case, which occasion'd one a little tartly to say, That whereas some other men had Guts in their Brains ; Dr. Venner's Brains were in his Guts.*"

Guidott evidently had a spite against Venner, for he laboriously dissects a conventionally fulsome epitaph in Bath Abbey Church, while the only reference which he makes to his writings is in the following passage, in which the malice is more apparent than the wit :—

"However he found the right way to write a book called *Via Recta ad Vitam Longam*, wherein is this memorable observation, *That a Gammon of Bacon is of the same nature with the rest of the hog.* He wrote also a little discourse of *Bathe*, thereby expressing his goodwill to the Waters which, had it been bigger, he should have had more thanks, but being very small must be contented with the like commendation."

The purport of Venner's chief work, which was printed in London in 1638, may be gathered from its title :—"Via Recta ad Vitam Longam, or A Plain Philosophicall Demonstration of the Nature, Faculties and Effects of all such things as by way of nourishments make for the preservation of health, with divers necessary dieteticall observations ; as also of the true use and effects of Sleep, Exercise, Excretions and Perturbations, with just applications to every age, constitution of body, and time of yeare." To this is appended :—

"A necessary and compendious Treatise of the famous Baths of Bathe, with a censure of the medicinable faculties of

the water of Saint *Vincent's* Rocks neere the City of Bristol ; also an accurate Treatise concerning Tobacco." The full title of the treatise so slightly mentioned by Guidott sufficiently indicates its character. It runs :—

"The Baths of Bathe, or a necessary Compendious treatise concerning the Nature, use and efficacie of those famous Hot Waters. Published for the benefit of all such as yeerely for their health resort to those Baths. With an Advertisement of the great utility that commeth to mans body, by the taking of Physick in the Spring, inferred upon a Question moved, concerning the frequence of sicknesse and death of people more in that season than in any other."

Venner warns those who go to Bath against the wiles of the local harpies who prey upon visitors, incidentally giving a curious picture of the manners and customs of the time. He says :—

"The thing therefore that I would have you take to notice of, is, how the people of that place that keep houses of receipt, and their Agents (for such they have in every corner of the streets and also before you come to the Gates) presse upon you, importuning you to take your lodging at such and such an house, neere to such and such a Bath, extolling the Baths neere which they dwell, above the rest, respecting altogether their own gain, not your good or welfare. And when they have gotten you into their houses, they will be ready to fit you with a Physician (perhaps a Doctor of their own creation, as some Emperick upstart Apothecary, or the like, magnifying him for the best Physician in the Towne) that will not crosse them in removing you to another Bath, though the Bath neere which you are placed be altogether contrary to your infirmities and state of body, or at least, not so convenient as some other. And this also a special reason, why many oftentimes receive rather hurt than good by the use of the Baths."

He next has a word of advice for the physicians :—

"My Counsell therefore to the learned Physicians shall be this, that they so tender the good of their Patients, and their own worth and reputation, as that for base gaine they subject not themselves to these kind of people, in hope to get Patients by their meanes ; and to the Patients, that they fall not by any meanes into the hands of Empericks, who, by

their ill qualified Physick, will spoyle their bodies, and by reason of their pragmaticall nature, persuade and put them to unnecessary and preposterous courses, which cannot but produce disastrous effects."

Apparently some of the Bath physicians of his day were not above what would now be called unprofessional advertising, as may be gathered from the following passage :—

"But seeing that no calling is more disgraced, than by the men of the same calling, I wish all professors of Physick to carry themselves worthy of their calling, to be faithfull and honest in their courses, not to insinuate with any, or after the manner of our Bath-guides, presse upon them to bee retained. If an Emperick or Mountibank seek about for work, I blame them not; let them deceive those who will be deceived; but for such as are graduated in the noble faculty of Physick to do so, it is Fidler-like: a note, if not of some unworthinesse in them, I am sure, of a base mind. Let those therefore that are Physicians indeed, strive to maintaine the reputation of their Art, and not by a base insinuating carriage, or Mountibank-like tricks, to get a note and repute, vilifie their owne worth, or disgrace so noble a Faculty."

Lastly, he has counsel for the patients, the chief being that they should be careful to place themselves under the care of a local doctor :—

"But to draw to an end, when you shall for your health repaire to the Baths, be cautelous, and suffer not yourself to be taken up by such as will presse upon you; but rest your selfe at your Inne, and be well advised by a Physician that knows the nature and use of the Baths, and can well judge of your infirmities and state of body, what Bath shall bee fitting for your use, and then take up your lodging accordingly: which course if it were observed, and the Physician carefully and learnedly performe his part, I am persuaded that many more than now do, would, for their infirmities, finde remedy at the Baths, to the great honour of the place, and that scarcely any would depart thence, but much eased and bettered in their state of body."

Venner died in 1660.



NOTES FROM FOREIGN JOURNALS.

TREATMENT OF ACNE.

La Médecine Moderne (12 July 1905) reports a lecture by Jeanselme on this, in which he urges attention to the digestive system. Constipation must be overcome, if necessary, by large irrigations of boiled water, or of water from a mineral source. Gastric symptoms should be treated with charcoal, magnesia, or hydrochloric acid, according to indications. Stress is laid on correct dieting, which must be simple but ample; meats (grilled, boiled, or roasted), green vegetables, purées, cooked fruits, or thoroughly ripe fruit during the season. No seasonings or condiments are allowed, nor the greater number of the fatty foods, fish, preserved foods, game, and fermented cheeses. Pure water, an alkaline water, or very weak tea, is best to drink. Strong tea, coffee, liqueurs, and fermented drinks must be stopped.

For lymphatic subjects, bodily exercise and hydrotherapy, salt baths, and massage are prescribed, and internally cod-liver oil and the arseniates are given. Anæmia calls for iron, and arthritic patients require alkaline treatment.

Sulphur is the specific local application. It should be rubbed in at night, after washing in very hot water (pure or slightly alkaline), in the form of—

R. Sulphur. præcip. - - - - - gr. xv—xlv.
Vaselini, Adipis, vel Ung. Cetacei - - - - - 3 i. M.

Ichthylol may be used in the form of an ointment, $\frac{1}{10}$ th, or $\frac{1}{10}$ th, and perfumed, or a lotion like the following:—

R. Sulphur. præcip. - - - - - 3 ii ss—v.
Glycerini - - - - - 3 ii ss.
Spirit. Camphor. - - - - - 3 ss.
Aq. ad - - - - - 3 iij. M.

If sulphur causes irritation, its application should be alternated with a mixture of equal parts of vaseline, talc, and oxide of zinc.

Comedones must be extracted after a light soaping with soft potash soap and frequent sprayings of simple boiled water, but no antiseptics.

Yeast internally is recommended.

CLAVIN, A NEW DERIVATIVE OF ERGOT.

Vahlen has succeeded in obtaining from ergot a chemically distinct crystalline body, to which is given the empirical formula $C_{11}H_{12}N_2O_4$. It crystallises out of hot alcoholic solution in prisms 7 to 8 mm. long. These sublime on careful heating, and they are soluble in dilute alcohol and in water, but insoluble in cold absolute alcohol, ether, and benzene. When given internally, it does not produce cramping pains, or gangrene, like ergot, and is free from other general effects. Animals can bear intravenous injections of several decigrammes without toxic symptoms. Its specific effect on the uterus is apparent after doses of some centigrammes.

It has been tried in the Frauenklinik at Halle, and in the "Charité" at Berlin, and proved effective in dilatatory pains. Given by the mouth, or subcutaneously, tablets containing 2 cg. being used; for injection, the tablets contain 2 cg. of clavin and 8 cg. of NaCl, one being dissolved in 1 c.c. of water. The aqueous solution can be sterilised, and solutions should always be freshly prepared, as they get cloudy on standing, and develop an unpleasant taste. (*Therap. Monat.*, Sept. 1905.)

TREATMENT OF PRURITUS VALVÆ.

Leredde (*Revue pratique des Mal. Cut.*) recommends a simple method of treating this condition, which is efficacious for relief, and sometimes for cure. The external and internal surfaces of the labia majora and the labia minora are covered with zinc paste, and a gauze "wick" is introduced into the vagina in order to keep the mucous surfaces apart. This dressing must be changed each time the patient makes water. The application may fail when lichenification, or skin troubles, are present, but Leredde combines it with radiotherapy in that case, and nearly always obtains a cure of this troublesome affection, which is generally regarded as incurable.

KERNIG'S SIGN IN MENINGITIS.

Dr. Sainton discusses, in *Le Bulletin Médical*, the importance of this phenomenon and the best method of eliciting it. Kernig himself originally advised placing the patient on the edge of the bed; but for the most part the patient is seated in the bed with the buttocks and lower limbs in a horizontal plane. An effort is then made to obtain complete extension of the lower limbs, and, when Kernig's sign is present, this is rendered impossible by reason of a strong contraction of the ham muscles keeping the knee-joint partly flexed. Sometimes pain on a level with the thighs, accompanied by slight flexion, marks the reaction of the contraction, and is the indication of Kernig's sign.

When the patient is in a state of pronounced rigidity, Osler prefers to leave him extended on the bed, and to raise the lower limb, carrying out a procedure similar to that used to elicit Laségue's sign in sciatica. Sainton proposes to make this method general, for if it is only applicable in cases of meningitis with strong contractions already present, no great importance attaches to it. There are, however, three advantages which make it a method of first importance. First, it avoids the jerks which are sometimes very painful to the patient, in whom the least change of position occasions painfully violent reactions; second, it is easily applied to children, and, as the sitting position is not necessary, there is no trouble in arranging for the test an ignorant patient, or one beyond the stage of comprehending what is required; third, contrary to the opinion, expressed by Roglet in an inaugural thesis, the method appears to have greater value than the others employed, and seems to be more sensible. In several patients suffering from cerebro-spinal meningitis (confirmed by lumbar puncture), and presenting remissions, Kernig's sign was negative in the sitting position, while, on the other hand, when this method was practised, it was found that, when the limb was raised only so much as to make an angle of 120° between the thigh and pelvis, a slight pain was produced, which was immediately followed by an

invincible contraction in the ham-muscles and flexion of the knee-joint. During the period of exacerbation, Kernig's sign, tested for in the usual way, reappeared, but was manifested with far more energy when applied in the recumbent position.

Sainton from these facts recommends that, when it is desired to seek for Kernig's sign, under the best conditions for revealing the least trace of its presence, the patient must be left recumbent in the bed, resting the head low on a bolster, the extended limb should then be raised very slowly, and deliberately, with one hand applied to the upper part of the knee. When the thigh forms with the plane of the bed an obtuse angle of 130° to 120° , if the symptom is present, there is felt a progressive, but invincible, contraction at the knee-joint. Carried out in this way, Sainton considers the search for Kernig's symptom to be at once more sensible and easier for the practitioner.

TREATMENT OF OBSTINATE NEURALGIA BY OSMIC ACID.

Dr. Wayne Badcock, Professor of Surgery, Temple College, Philadelphia, advocates the employment of osmic acid in the treatment of neuralgia. He reports a case of tic douloureux of long standing in which various resections of nerves had been performed without benefit. He exposed the inferior dental nerve, and injected \mathfrak{M} xij of a 2 per cent. solution of osmic acid into the trunk. After the first night, the relief was complete and permanent. He considers that this method should be properly tried before resorting to removal of the Gasserian ganglion. Treatment of neuralgia (sciatica) by osmic acid was first introduced about five and twenty years ago. Weak solutions were injected as close to the nerve as possible. The results were untrustworthy, and the treatment was given up. It was again tried, about eight years since, by W. H. Bennett, who exposed the nerve, and injected \mathfrak{M} x—xv of 1 per cent. solution directly into the trunk. His results were uniformly favourable (*Therap. Gazette*, Aug. 1905). Other cases of sciatica are known in which osmic acid was injected into the nerve trunk, and complete relief was obtained. One case, a working man, was completely incapacitated by sciatica. One injection into the nerve was given ten years ago, and he has been able to earn his living properly ever since.

TREATMENT OF HYPERIDROSIS.

The problem of sweaty feet appears to call for a good deal of attention in the German army. Various remedies have been tried (including chromic acid), but have been given up. The following ointment is now in use:—

\mathfrak{R} Formaldehyd. Solut. (35 per cent.)	-	-	-	\mathfrak{Z} xi.
Sapo. Med. pulv.	-	-	-	\mathfrak{Z} i ss.
Paraffin. Solidi	-	-	-	\mathfrak{Z} v.
Lanolin.	-	-	-	\mathfrak{Z} v.
Thymol. (v. Ess. Gaultherii)	-	-	-	\mathfrak{Z} i ss.
Sebi. Salicylati	-	-	-	\mathfrak{Z} xvi.

Shake up the soap and formaldehyde solution in a bottle with a large neck; close and warm slightly to get them well mixed. Melt the paraffin,

lanolin, and salicylic talc together; add to the mixture, and shake up briskly. After cooling, add the thymol dissolved in a little alcohol.

The ointment is issued in a tin box with a sliding cover. It is thoroughly rubbed into the feet, but care must be taken not to bring it near the eyes. A slight burning sensation is caused to excoriations, but this soon passes off.

Stabsarzt Fischer recommends (*Münch. med. Woch.*, No. 20, 1905) a powder composed of zinc oxide 20 per cent., formalin 5 to 10 per cent., salicylic acid 1 per cent., and vasenol. The last-named is a special powder devised by his colleague, Dr. Köpp, of Leipzig. The foot is first well rubbed over with spirit containing 1 per cent. of salicylic acid, and the powder is then rubbed in (it must not be dusted about on account of the eyes), special attention being paid to the skin between and under the toes. The foot gear has a little of the powder shaken into it. The application is made night and morning. Bromidrosis has disappeared by the second day, and the feet are well in a week, with, however, some blackish discoloration of the horny layer of the skin.

TREATMENT OF CHRONIC METRITIS.

A lecture by Albert Robin, published in *Le Bulletin de Thérapeutique*, gives the lines of internal treatment which he adopts, as a rule, in addition to local applications:—

R. Sodii Arseniat.	-	-	-	-	-	gr. 4.
Potass. Iodid.	-	-	-	-	-	3 i ss.
Aq. dest.	-	-	-	-	-	ad. 3 viij. M.

Fiat Mist.: "One teaspoonful to be taken early in the morning, and another before dinner, for ten days."

For the next ten days, the following is to be taken, also twice daily:—

R. Ergot.	-	-	-	-	-	gr. ij.-iiij.
Pulv. Calumbæ	-	-	-	-	-	} 3i gr. iv.
Pulv. Canellæ	-	-	-	-	-	
Pulv. Ferri Carb.	-	-	-	-	-	gr. ij. M.
Pro Cachet i.	Mitte tales xx.					

These two medicines are to be alternated so long as necessary, with due regard to gastric tolerance.

The resolution of the metritis is helped by rubbing a fair quantity of the following ointment into the abdomen, night and morning, then covering with a layer of wool kept on by a bandage:—

R. Ergotin. (Bonjean)	-	-	-	-	-	gr. xlv.
Potass. Iodid.	-	-	-	-	-	gr. xlv.
Ext. Nucis Vom.	-	-	-	-	-	gr. xv.
Vaselini	-	-	-	-	-	3 i. M.

Ft. ung.

TREATMENT OF VARICOSE ECZEMA.

Unna recommends:—

R. Zinci Oxydi	-	-	-	-	-	} 3i 3 ii ss.
Gelatini	-	-	-	-	-	
Glycerini	-	-	-	-	-	} 3i 3 i ss.
Aq. dest.	-	-	-	-	-	

3 K 2

Soak the gelatine in three-quarters of the water, add three-quarters of the glycerine, and complete solution in a *bain-marie*. Mix the zinc oxide in a mortar with the rest of the glycerine, and add the remainder of the water. Then mix the whole with the gelatine solution. For use, spread a thin layer over the part affected, and cover with a bandage.

THYMIC ACID AS A TÆNIFUGE.

Numa Campi calls attention to the usefulness of this drug, which has been used by Frederici with good effect against the *Ankylostomum duodenale*, affecting the workmen in the St. Gothard tunnel. Vanna gives it in a dose of 6 grammes (3 iss), divided into twelve doses, one being given every quarter of an hour. At the end of the third hour, the worm is expelled complete. Campi recommends this method:—In the evening give about an ounce of castor oil; next morning, upon an empty stomach, 8 grammes (3 ij) of thymic acid, divided into twelve doses, one of which is given every quarter of an hour. After giving the last cachet of thymol, give an ounce of castor oil. (*Therap. Monat.*)

TREATMENT OF GASTRIC PAINS.

One of the last lectures, given before his death by Soupault, is reported in *Le Journal des Sc. méd. de Lille*. In general, treatment should be:—
(1) *Local*: by modification of diet and external applications. As regards diet, if the pain is acute, milk diet must be enforced, if vomiting is present, the milk diet must be preceded by complete abstinence for one day or even more. If the pain is due to simple dyspepsia, begin with milk diet alone, to which may be added later: bouilli, clear purées and eggs, but no bread. Meat excites peptic secretion, so that bouillon and extracts must be proscribed. External applications must not be neglected, for the object of most of them is to quiet the stomach. This is usually obtained by a cold wet compress, applied to the epigastrium, half an hour after a meal, and kept on all night. With nervous patients, better effects are obtained by counter irritants (mustard, cantharides, or Corrigan's button).

(2) *General*: the sedative element *par excellence* is rest. The patient should be kept in bed for from 10 to 15 days. Nervous patients should remain in bed from 15 to 18 hours daily for one or two months. After meals, there should be a rest of from a half to three-quarters of an hour in the horizontal position. The physician should be very sparing of drugs, in fact avoid them, whenever and as much as possible, seeking out the cause before giving this or that. If the pain is gastric, and clearly increased by pressure, the following is recommended:—

℞ Cocainæ Hydrochloratis	-	-	-	-	gr. i ss. iij.
Dionini vel Codeinæ	-	-	-	-	gr. i ss.
Aq.	-	-	-	-	ad. 3 v. M.

Fiat mist. Capiat 3 i 4th horis.

This may be taken before or after meals, as may be found more suitable. If the central nervous system is implicated, he uses:—

℞ Calcii Bromidi	-	-	-	-	3 ii ss.
Chloralis Hydratis	-	-	-	-	gr. xl.
Codeinæ	-	-	-	-	gr. iij.
Aq. Laurocerasi	-	-	-	-	3 iij.
Aq.	-	-	-	-	ad. 3 vi. M.

Fiat mist. Capiat 3 i 4th horis.

For tardy pains, bicarbonate of soda pure, or with other alkalies, is best, whatever the cause; e.g. :—

℞ Sodæ Bicarbonatis	-	-	-	-	-	-	} ʒʒ. gr. iv.
Cretæ Præparatæ	-	-	-	-	-	-	
Magnesiæ Calcinatæ	-	-	-	-	-	-	
· Bismuthi Subnitratiss	-	-	-	-	-	-	
Codeinæ	-	-	-	-	-	-	gr. ʒʒ. M.

Fiat pulv. i.

To be taken in a cachet every two or three hours after rising.

RACHICOCAINISATION.

In a lengthy paper, read before the Société Médicale du IX^e Arrondissement de Paris in May, M. le Filliatre, Surgeon to the Central Infirmary of Prisons, gave a detailed account of his experiences of this method of inducing general anæsthesia.

The experience covers a series of 452 operations, which are classified thus :—

Operations on the lower limbs	-	-	-	-	97
" " perineum, scrotum, or vulva	-	-	-	-	112
" " genito-urinary organs, male and female,					
and in the lumbo-sacral region	-	-	-	-	62
" " margin of anus and rectum	-	-	-	-	48
Laparotomies, herniotomies, and hypogastric cystotomies					130
Operation on upper limb	-	-	-	-	1
" " thorax	-	-	-	-	2

le F. was considerably discouraged at first by the poor and untrustworthy anæsthetic results obtained, and by the invariable after-effects: headache, vomiting, and hyperpyrexia. Acting on a suggestion to remove some of the cerebro-spinal fluid before injecting the cocaine, he found that his results improved. The difference in the tension of the arachnoid space is shown by the character of the jet obtained by the puncture, which in some cases spurts out, while in others it flows out *guttatim*. He now waits until the fluid comes out drop by drop, and then aspirates a known quantity, 10 cc. This produces hypo-tension, and he then injects the cocaine solution with completely satisfactory results as regards the anæsthesia produced, the time it takes to appear, its duration, and the almost complete absence of any after-effects. He prefers puncture in the 5th lumbar space to that in the 4th, as there is greater ease in puncturing by reason of more space (18 to 20 mm. in the lumbo-sacral space against 12 to 13 mm. vertical height in the 4th lumbar space), and because the nerve trunks in the cauda equina are less numerous, and therefore there is less risk of wounding one. le F. punctures about half an inch to the right, below and outside the 5th spinous process, holding the needle with its point directed upwards and inwards. He first finds the 4th spinous process, the patient being seated with trunk upright, thighs slightly separated, and the arms carried in front of the body. The surgeon stands behind, and a little to the left. The 4th spinous process is found at the intersection of the line of the spinous processes with a line joining the summits of the two iliac crests. The index finger is placed on this, and the thumb easily picks out the 5th process below it. This found and kept marked, the patient then makes a "great back,"

flexing the spinal column so as to obtain the maximum separation of the laminæ of the vertebræ; and the puncture is then made. The needle used is of platinum-iridium, $11\frac{1}{2}$ to 12 cm. long, and 1 mm. in diameter (internal). Any sort of syringe, which can be sterilised thoroughly, is available. The solution, used for injection, is an aqueous solution of cocaine, 1 in 50, sterilised for 20 minutes at 120° C. in a water oven, and sealed up in bulbs holding 3 cc. The amount used for injection is 2 cc. Analgesia is established in from 3 to 4 minutes, and lasts, on an average, $1\frac{1}{2}$ hours. He has experienced no attacks of vomiting, no headache, or spinal pain, no rise of temperature, and no relaxation of the sphincters. Some cases complain of slight nausea when the tension of the arachnoid cavity is lowered by puncture.

Stovain was tried in some cases, but was most unsatisfactory at the time, and afterwards.—(*Journal de Médecine*.)

SANTONIN IN PHTHISIS.

This is used in Tashkend by the natives for the cure of the disease, and apparently with success. Carl Tollens has made a series of researches in Göttingen on its pharmacological properties and finds that it lowers the temperature, and influences the respirations, by decreasing their rate, and increasing their volume; phagocytosis is also increased.—(*Munch. med. Woch.*)

FOR HYPERCHLORHYDRIA.

Von Bergmann uses tablets containing pilocarpine and alkalies.

Albu, of Berlin, recommends:—

℞ Ext. Belladonnæ	-	-	-	-	-	gr. v.
Bismuthi Subnit.						
Magnesiae	-	-	-	-	-	} ʒ ʒ ii ss. M.
Sodæ Bicarb.	-	-	-	-	-	
Ft. pulv.						

"Half a teaspoonful to be taken one to two hours after the chief meals of the day."

PARAPHIMOSIS.

Chambeaux found that reduction was greatly facilitated by bathing the penis for 10 minutes in a warm solution of hydrochlorate of cocaine (1 per cent).—(*Concours médical*.)



Reviews of Books.

NOTES ON NEW EDITIONS.

The Principles and Practice of Medicine for the Use of Students and Practitioners. By WILLIAM OSLER, M.D., F.R.S., F.R.C.P. (Lond.). Pp. 1143. London: Sidney Appleton, New York: D. Appleton & Co. Price 21s. net.

PROFESSOR OSLER has laid the profession under deep obligation to him by the publication of a new edition, the sixth, of his *Principles and Practice of Medicine*. This valuable work has been entirely re-written, and contains many very important changes and additions. Among these we may mention that the diseases due to Protozoa have been grouped together, and sections upon Tropical Anæmia and Trypanosomiasis added; that a great deal of new matter has been added on the diseases due to parasites; that important changes have been made in the chapters on Specific Infectious Diseases, especially in the articles on Typhoid Fever, Measles, and Scarlet Fever; and that valuable additions have been made in the Section on Diseases of the Nervous System. The charts and illustrations are beautifully clear and accurate, and considerably enhance the value of the work. There are ten pages of carefully-arranged contents, and an exhaustive well-prepared index, thus making the volume especially useful to both student and practitioner. Notwithstanding the increase of matter, by the enlargement of the page, and the use of an exceptionally clear style of type, the publisher has been able to keep the work within the limits of a single, compact, and by no means unhandy volume. We have no hesitation in saying that Professor Osler's book should be found on the shelf of every practitioner.

A Manual of Surgery for Students and Practitioners. By WILLIAM ROSE, M.B., B.S. Lond., F.R.C.S., and ALBERT CARLESS, M.S. Lond., F.R.C.S. Pp. xiv + 1350. London: Baillière, Tindall and Cox. Price 21s. net, cloth; 25s. net, leather.

BOTH students and practitioners, will gladly welcome a new edition (the sixth) of this valuable manual. The responsibility of issuing it has mainly devolved upon Professor Carless, who has accomplished the task with care and accuracy. In bringing the pathological side of the work up to date, he has availed himself of the valuable assistance of Dr. W. D'Este Emery, clinical pathologist to King's College Hospital, who has re-written the opening chapter in "Bacteriology," and added one on "The Blood in Health and Disease." We observe also that a fresh chapter has been devoted to modern surgical technique, that the section on the head and brain has been re-arranged, that abdominal surgery is more efficiently dealt with, and that a chapter dealing with the surgical aspects of gynaecology has been added. Notwithstanding the fact that this new edition contains 137 pages more than its predecessor, the use of finer paper has rendered it less bulky than the 5th edition. The volume contains 530 illustrations, many of which are from entirely new blocks. A copious index, judiciously arranged, will be highly esteemed by all who have the good fortune to use the manual of Professors Rose and Carless.

The Diseases of Children. By JAMES FREDERIC GOODHART, M.D., LL.D., F.R.C.P., and GEORGE FREDERIC STILL, M.A., M.D., F.R.C.P.
London: J. & A. Churchill. 12s. 6d. net.

SINCE 1885, this valuable book has run through eight editions, of which the last is before us. The whole book has been most carefully and thoroughly supervised under the able editorship of Dr. G. F. Still, and we look upon it as a trustworthy standard work on a subject of increasing importance. Every general practitioner should have it on his bookshelf, for we consider it to be one of the best books of its kind. At the end is an appendix, which contains a number of useful formulæ.

A Short Practice of Midwifery for Nurses, embodying the Treatment adopted in the Rotunda Hospital, Dublin. By HENRY JELLETT, M.D., F.R.C.P.I
London: J. & A. Churchill. 6s. 6d. net.

IN this, the second edition, the author has thoroughly revised the former, and produced a very valuable book for nurses. There are five coloured plates and 133 illustrations, of which many are new, while a glossary of medical terms has been added. The book deals chiefly with the normal conditions of pregnancy, and the management of parturient and puerperal women. Abnormal conditions are briefly described, and it is pointed out how a nurse, with the necessary knowledge and forethought, may greatly assist a medical man in an emergency.

At the present time, when the practice of midwifery is a recognised profession for women, this work ought to be largely in request by nurses.

The Practice of Medicine. A Text-book for Practitioners and Students, with special reference to Diagnosis and Treatment. By Dr. JAMES TYSON
London: Rebman, Ltd. 24s. net.

THE first edition of this work appeared in 1896, and since that time it has gone through three editions. The third, now before us, has been thoroughly revised and enlarged. The greatest number of alterations occurs, however, in the section on the specific infectious diseases. The section relating to dysentery has been revised, and, in a great measure, re-written by Dr. Simon Flexner. One hundred and thirty-four illustrations, including a few coloured plates, all of which are good, add to the value of the book.

The Essentials of Obstetrics, arranged in the form of Questions and Answers. By Dr. WILLIAM EASTERLY ASHTON. London: Henry Kimpton. 4s. net.

THE fact that a sixth edition of this work has been called for is sufficient to indicate that it is thoroughly appreciated by students for whom it was especially written. The latest edition has been revised, and, so far as possible, represents the up-to-date views of the obstetric teachers.

The Book of Prescriptions (BRASLEY), with an Index of Diseases and Remedies. London: J. & A. Churchill.

THE members of the medical profession are already well acquainted with this useful little book. We have before us the eighth edition, which has been re-written by Mr. E. W. Lucas, to which has been added an excellent introductory chapter by Dr. Arthur Latham. The recent additions to *materia medica* have rendered this new edition necessary, and we may say that it has been carefully brought up to date, for all the more important

synthetic remedies are mentioned, and specific examples of prescriptions containing these have been included. We can with confidence recommend this book to senior medical students, but we also believe that general medical practitioners will find it most useful and helpful.

The Diagnosis of Diseases of Women ; a Treatise for Students and Practitioners.

By PALMER FINDLEY, B.S., M.D., Assistant Professor of Gynæcology and Obstetrics, Rush Medical College (University of Chicago). Second Edition. Revised and Enlarged. Pp. 588. Royal 8vo. 222 illustrations and 59 coloured plates. London: Ballière, Tindall and Cox.

THIS is a most comprehensive treatise, which includes chapters on all the urinary organs, as well as others on section-cutting, blood-examination, and bacteriological work. The title is strictly adhered to throughout, for not one hint of treatment is vouchsafed.

That such a book has been found useful is evident from the fact that the first edition only appeared so recently as 1903. There is a wealth of illustration, including coloured plates of exceptional merit, many of which show the microscopical details of the chief diseases.

It would seem, however, that the mass of information is more than is required for the ordinary student and the practitioner, except as a work of reference, or unless the object in view is taking up this particular subject as a specialism. The latter is a matter, which is very largely undertaken in North and South America, where perhaps the field is larger, than on this side of the globe. For such as intend to specialise, this book will be useful; for others there seems to be no advantage in separating diagnosis from treatment.

Materia Medica and Therapeutics. By J. MITCHELL BRUCE, M.A., LL.D., M.D. Pp. 632. London: Cassell & Co., Ltd. Price 7s. 6d.

THE present new edition of this well-known book has been thoroughly revised and brought up to the level of our latest knowledge. Its usefulness has been greatly enhanced by the addition of an account of the *Materia Medica and Therapeutics* of the drugs in the Indian and Colonial Addendum to the British Pharmacopœia. The book is one which may be recommended with the utmost confidence to medical students preparing for their examinations.

Clinical Methods : A Guide to the Practical Study of Medicine. By ROBERT HUTCHISON, M.D., F.R.C.P., and HARRY RAINY, M.A., F.R.C.P. Edin. Pp. 634. London: Cassell & Co., Ltd. Price 10s. 6d.

SINCE the second edition of this work was published in 1904, many important advances have been made in medicine. The authors have incorporated such portions of this new material, as are likely to prove of permanent value, and are capable of clinical application, in this, the third edition now before us. The general plan of the book has not been in any way altered, though there are many alterations and additions. There are more than 150 illustrations and 9 excellent coloured plates.

Hygiene and Public Health. By B. ARTHUR WHITELEGGE, C.B., M.D., B.Sc. Lond., F.R.C.P., D.P.H., and GEORGE NEWMAN, M.D., D.P.H., F.R.S.E. Pp. 636. London: Cassell & Co., Ltd. Price 7s. 6d.

THE new edition of this exceedingly useful work, which has been revised, enlarged, and in great part re-written, will be heartily welcomed by all

students and medical officers of health. In view of the many important additions, which have been recently made, to the official duties of the latter; and the fuller application of scientific knowledge, which is now required in preventive medicine, the publication of this newly revised edition cannot but be considered as very timely. The authors are to be congratulated on the production of an up-to-date volume, useful alike to students and medical officers, and also to the most intelligent of our public teachers in both elementary and secondary schools.

The Treatment of Fractures, with Notes upon a few Common Dislocations.

By CHARLES LOCKE SCUDDER, M.D., Surgeon to the Massachusetts General Hospital. Philadelphia and London: W. B. Saunders & Co. Pp. 563. 8vo. Polished buckram. Price 21s. net.

SINCE 1900, this book has gone through four editions. In the one before us, the fifth, there are 739 illustrations, which include many new X-ray plates, illustrating the actual line of fracture. Many half-tones have also been added, which increase the value of an exceptionally fine set of illustrations. We note a few changes in the text. The chapter, which includes an account of fractures of the neck of the femur, is an extremely useful one, and should be carefully studied by all interested in the treatment of injuries in this region. As in previous editions, the type is excellent, and the book exceedingly well got up. It is a standard work on the subject, and there is a useful bibliography at the end.

A Manual of Chemistry, Inorganic and Organic, covering the Synopses of the Conjoint Board and the Society of Apothecaries.

By ARTHUR P. LUFF, M.D., B.Sc. (Lond.), F.R.C.P., F.I.C., Physician to St. Mary's Hospital, and FREDERIC JAMES M. PAGE, B.Sc. (Lond.), F.I.C., Lecturer on Chemistry and Physics to the London Hospital Medical College. Pp. 555; illustrations, 43. London: Cassell & Co., Ltd. Price 7s. 6d.

THE authors are to be congratulated upon the third edition of their book, which has been thoroughly revised. The first part has been re-arranged, while the fourth part has now short descriptions of the determination of the boiling-point and the melting-point, and also the connection between the structure of a substance, and its behaviour to polarised light. Chapter eleven is an interesting one, as it contains a brief description of such substances as antipyrin, argyrol, aspirin, peroin, salol, urotropine, and veronal.

Post-mortem Pathology. A Manual of Post-mortem Examinations and the Interpretations to be drawn therefrom.

By HENRY W. CATTELL, A.M., M.D. Pp. 551. London: J. B. Lippincott Co.

THIS volume is one of the best of its kind upon the subject of post-mortem examinations. This, the second edition, has been thoroughly revised and new matter added. For instance, there is a new chapter upon the pathology of bones and joints, and a summary of the literature on legal medicine, and the technique of post-mortem examinations. There are many new illustrations, some of which are in colours. The book is one which may be safely recommended to those practitioners who may want some practical guidance in the performance of post-mortem examinations.



Notes by the Way.

Congress Organisation.

THAT the congress is a useful institution in its way can scarcely be denied. That it is too much with us, however, at the present day is past question. Not only are there too many congresses, but some of them at least have become so unwieldy, that they are in danger of perishing of their own bulk. One fatal flaw in organisation runs through them all, and that is the needless waste of time caused by the reading of long papers. This might easily be remedied, at least to some extent, by having the papers or reports with which discussions are to be introduced printed beforehand and circulated among members. At the meeting these might be taken as read, and the discussion on the points raised in them might begin at once. Discussion is the very breath of life of a congress; papers can be read at home, but it is in debate that new truths are struck from the shock of mind against mind. There should be a time limit for speakers, and this should be enforced with impartial strictness. Irrelevancy and twaddle should be sternly ruled out by the President, who should be formally invested with powers for the purpose, subject to an appeal to the meeting if they are too arbitrarily exercised. At the Tuberculosis Congress, held in Paris last October, the reading of reports occupied the greater part of each sitting, and the audience was thus very much in the position of a congregation doomed to listen to a series of sermons without the opportunity of reply. We venture to call the attention of the organisers of the Congress which is to be held at Washington to the simple reform here suggested. It is applicable to all congresses, for at all scientific assemblies the drone of the reader is so predominant, that the living voice of discussion has little chance of making itself heard.

The Behring Incident.

THE question of congress organisation recalls the Behring incident, which was so much discussed by the newspapers as well as by the medical profession. What purports to be the "true story" was published not long ago in the *Gaulois*. In that account the responsibility for the sensation is placed on the shoulders of a journalist who met Professor Behring at dinner during

the Congress. The Professor, it is said, does not speak much French, and his statement that he had found a cure for *bovine tuberculosis* was misconstrued into an assertion that he had discovered a cure for consumption. We are asked to believe that in this way an enterprising Paris newspaper was misled into publishing a statement, which was not merely premature, but positively false. This explanation may possibly be true, but we regret to say that we cannot believe it to be the whole truth. It is likely enough, however, that Professor Behring's hand was forced. It would seem that he was unwittingly made to play the part of a muzzler to Dr. Marmorek, to whom, for some reason, the authorities of the Congress were unwilling to grant a hearing. It is certain that the manner in which Professor Behring was put forward was, to say the least of it, unusual. The General Secretary announced in a loud voice at one of the public sittings, where no discussion was possible, that "By order of the President, Professor Behring was to be allowed to make a communication, &c." It is pretty clear that a sensation was deliberately engineered by some one. The profession has grown tired of the frequent announcement of discoveries by well-known scientists; it has been taken in so often that it has also become suspicious. It is a pity that both advertising discoverers and sensational journalists cannot be made amenable to punishment for the publication of false news. The amount of suffering which such exaggerated statements cause is past all computation, and there should be some legal provision to protect the public from what is a particularly cruel form of deception.

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**A London School
 of Clinical
 Medicine.**

POST-GRADUATE instruction is no longer a luxury to be indulged in only by enthusiasts; the enormous expansion of medical science, and the constant additions to the resources of medical art, make it an imperative necessity for all practitioners who are not content to jog along in the groove of routine, which tends to become narrower as the lapse of years brings us nearer to the period when the mind as it were ossifies and ceases to be receptive. In medical practice, more than in any other sphere of activity, not to advance is to recede. In order to advance, however, the practitioner must keep in touch with the onward movement of knowledge. In response to this

need post-graduate schools have come into being. But the supply in London is still unequal to the demand. Hence the announcement that the Seamen's Hospital Society has, with characteristic energy and public spirit, decided to found a new school, will be welcomed by the progressive part of the medical profession. The Society has already done much for the advancement of medical science, as well as for humanity, by the liberal manner in which it has equipped the London School of Tropical Medicine. It is to be congratulated on the enlightened insight into what is a public even more than a professional need by deciding to found a complete school of post-graduate instruction in connection with the Seamen's Hospital at Greenwich. Knowledge, as Falstaff says, is like a hoard of gold kept by a devil till sack sets it in act and use. Something to the like effect may be said of a large collection of cases of disease not made available for teaching purposes. The Seamen's Hospital contains 250 beds, and it already has accommodation for all the essential needs of a school. It is proposed to establish an out-patient department, for which there is abundant room in Greenwich and its neighbourhood without in any way encroaching on the territory of local practitioners. To provide for all the needs of practitioners, and fully to justify its name as the "London School of Clinical Medicine," the new institution will join hands with various special hospitals in its vicinity. Owing to the fact that a very large proportion of the inmates are foreign sailors, there are probably more unclaimed bodies at the "*Dreadnought*" than at all the other London hospitals taken together. This will give the school unrivalled advantages for the teaching of operative surgery. It is proposed to appoint a medical and surgical staff that will comprise men of the highest standing in the profession, so as to ensure the best teaching in all branches of medical and surgical work, general and special. It is hoped that the school will be in working order by the beginning of the New Year.

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Disease as
Healer.

SIR FREDERICK TREVES'S address to the Edinburgh Philosophical Institute is doubtless not to be taken too seriously. In its glorification of the beneficent effect of disease, it reminds us a little of the largeness of sympathy with things that to

ordinary eyes are evil, which is displayed in Robert Burns's Address to the De'il. If Sir Frederick was somewhat dithyrambic in his praise of the phagocyte, his address was well calculated to make clear to the mind of the man in the street the working of the natural forces on whose help the physician relies in the struggle against disease. This ought to do much to uproot the superstitious belief in specifics for every ailment, that still prevails so largely in spite of the popularisation of scientific knowledge. If it be said that in the battle between invading organisms and the defensive powers of the organism the physician only plays the part of a bottle-holder, it may be replied that on the ministry of that humble necessary functionary the issue of the fight often depends. Anything that helps the public to understand the aims and methods of rational medicine is to be welcomed, and *videntem dicere verum quid vetat?* Sir Frederick Treves is entitled to the gratitude of the profession for a discourse so eminently calculated to fulfil its avowed object of fostering "an interest in the work of the physician that may lead to a sympathy with his endeavours and an appreciation of his difficulties."

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**The Discoverer of
the Phagocyte.**

THE mention of the fact that the body in sickness is a battlefield where invaders and defenders "fight to a finish," recalls the man who discovered our powerful ally, the phagocyte, and the mechanism of its protective action. It may not be amiss to give some details of the life of Elie Metchnikoff, to whom just two and a half wholly unilluminating lines are devoted in *Who's Who*. The authenticity of the account is guaranteed by the fact that it comes from the great scientist himself. He was born in 1845 at Livanovka, in the Kharkoff Government, amid the steppes of Southern Russia. His father was an officer of the Imperial Guard, who bred horses for the Russian Cavalry at Livanovka. His mother was a Polish Jewess. Metchnikoff describes himself as a mongrel, having in him more Hebrew blood than Slav. The bent of his mind towards natural science was revealed to him at the age of eight, when a medical student with a taste for botany came to prepare his elder brother for a public school. At the age of eleven Metchnikoff entered the Kharkoff *lycée*, where he remained seven years. He then entered the University of the

same town, and in due course obtained the degree of Licentiate, corresponding to our Bachelor of Arts. Afterwards he studied at Giessen under Leuckhart, celebrated as an authority on intestinal worms; at Göttingen, under the famous anatomist Henle, and at Munich under Siebold. It is worthy of note that Metchnikoff never took a degree in medicine; professional pedants might therefore justly taunt him, as they taunted Pasteur, with the fact that he is an "unqualified man." Almost from the first he gave himself up to zoology and anatomy. His researches on the lower animals led him to Italy, where he worked at the Naples Marine Station and elsewhere. For twelve years he was professor at Odessa; he resigned his chair in 1882 on account of the intolerable situation created by the murder of Alexander the Second, the perpetrator of which had been a student in that University. Metchnikoff, who has always held aloof from politics, returned to Italy, settling at Messina. There he studied comparative embryology and there too he discovered the phagocyte. In 1886 he returned to Russia and was appointed director of a bacteriological station at Odessa. As the country round about swarmed with mad dogs and wolves, he soon found that the number of patients requiring treatment left him no time to pursue his researches. He therefore gave up his post, and, turning his back finally on Russia, wandered about Europe for a time, finally settling in Paris. The Pasteur Institute was then in course of erection, and Metchnikoff offered his services to Pasteur, who at once placed a laboratory at his disposal. There he has remained for 17 years. He has had brilliant offers from Russia and America, but has steadfastly refused to leave Paris. He says: "I like the Institute and have numerous pupils. What more can I wish for?" His life, simple and strenuous, has been one of single-minded devotion to the search for truth.

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How to Blow the Nose.

EVERY Roman of the brave days of old was doubtless ambitious to be considered an *emunctæ naris homo*, which may be translated as "up to snuff." And it is true that a man who blows his nose properly has a claim to be considered exceptionally intelligent, for by the large majority of the human race, or such proportion of it as uses pocket-handkerchiefs, that simple act is wrongly performed. A hint on the subject may not be

inopportune at the present catarrhal season. Blowing the nose seems to the untutored mind a simple enough matter, and so it is to those who dispense with artificial aid. Here, as in other points of elementary hygiene, it is civilisation that is our undoing. In using a handkerchief most people blow more or less violently through both nostrils. If these are obstructed, as they are more or less in a common cold, the back of the throat is filled with compressed air, and this, together with the discharge with the microbes which it contains, may be driven through the Eustachian tube into the middle ear. This may easily lead to serious results. In blowing the nose, therefore, it is well to close one nostril with the handkerchief and blow gently through the other, repeating the process on the other side. A great authority used to forbid his patients to blow their noses at all when they suffered from cold; he held that the handkerchief should be used simply to wipe away discharge. This is a counsel of perfection. But if we must blow, let our blowing be done gently.

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**A Royal
Counterblast to
Tobacco.**

SOME months ago we published a number of utterances on the use and abuse of tobacco by competent authorities whose views we take as representative of modern opinion on the subject. It may amuse some of our readers if we now place before them some older views on the incomparable herb nicotin. When tobacco was first introduced into Europe, it was regarded as a panacea and especially as a preservative or antidote against syphilis, which, as was then thought, had recently been brought into Europe by the discoverers of America. This we learn from our British Solomon's famous "Counterblast to Tobacco," which saw the light in 1604. King James the First was the forerunner of the modern denouncer of tobacco. He believed that "there cannot be a more base, and yet hurtfull, corruption in a countrey than is the vile use (or other abuse) of taking Tobacco in this Kingdome." He was moved to write on the subject because it "is the King's part (as the proper Physician of his Politicke-body) to purge it of all those diseases, by Medicines meete for the same." We will spare the reader the royal arguments and will only quote the passage in which he ironically sums up the therapeutic virtues attributed to "this filthie smoake."

"For one cure must not ever be used for the selfsame disease, but according to the varying of any of the foresaid circumstances, that sort of remedie must be used which is fittest for the same. Whear by the contrarie in this case, such is the miraculous omnipotencie of our strong tasted *Tobacco*, as it cures all sorts of diseases (which never any drugge could do before) in all persons, and at all times. It cures all manner of distillations, either in the head or stomacke (if you believe their Axiomes) although in very deede it doe both corrupt the braine, and by causing over quicke digestion, fill the stomacke full of crudities. It cures the Gowt in the feet, and (which is miraculous) in that very instant when the smoke thereof, as light, flies up into the head, the vertue thereof, as heavie, runs downe to the little toe. It helps all sorts of Agues. It makes a man sober that was drunke. It refreshes a weary man, and yet makes a man hungry. Being taken when they goe to bed, it makes one sleepe soundly, and yet being taken when a man is sleepe and drowsie, it will, as they say, awake his braine, and quicken his understanding. As for curing of the Pockes, it serves for that use but among the pockie Indian slaves. Here in *England* it is refined, and will not deigne to cure heere any other then cleanly and gentlemanly diseases. O omnipotent power of *Tobacco* ! And if it could by the smoke thereof chace out devils, as the smoke of *Tobias* fish did (which I am sure could smel no stronglier), it would serve for a precious Relicke, both for the superstitious Priests, and the insolent Puritanes, to cast out devils withall."

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**An Episcopal
Fulmination.**

THE clergy naturally followed the lead of the supreme head of the church, and accordingly we find a few years after the issue of the "Counterblaste" Joseph Hall, the famous Bishop of Norwich, gibing at the "Gourmand" who "whiffles himself away in nicotian incense to the idol of his vaine intemperance."

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**A 17th Century
Medical Opinion.**

ELSEWHERE mention is made of Dr. Venner who in the 17th century was a tutelary deity of the Bath waters. He also posed as an oracle on tobacco. In a pamphlet entitled "A Briefe and Accurate Treatise concerning the Taking of the Fume of

Tobacco, which very many in these dayes doe too licenciously use : in which the immoderate, irregular, and unseasonable use thereof is reprehended, and the true nature and best manner of using it, perspicuously demonstrated," published in 1637, he summarily rehearses "the hurts that Tobacco inferreth, if it be used contrary to the order and the way" set down by him :

"It drieth the braine, dimmeth the sight, vitiateth the smell, hurteth the stomach, destroyeth the concoction, disturbeth the humors and spirits, corrupteth the breath, induceth a trembling of the limbes, exsiccateth the winde pipe, lungs and liver, annoyeth the milt, scorcheth the heart, and causeth the blood to be adusted. Moreover it eliquareth the pingine substance of the kidnies, and absume in the geniture. In a word, it overthroweth the spirits, perverteth the understanding and confoundeth the senses with a sudden astonishment and stupiditie of the whole body. All which hurts I affirme that the immoderate and intempestive use of Tobacco doth effect, like by reason of its temperament but especially through the propertie of its substance : Wherefore the use of it is only tolerable by way of Physick, not for pleasure or an idle custome.

Although it is clear enough that Venner was not a smoker, he is fain to allow that tobacco, like other evil things, has in it some tincture of goodness. "For mine owne part," he says, "I confesse that though I am in no wise delighted with the fume of Tobacco, partly for the malignity of its nature but especially because of the detestable savour or smack that it leaveth behind upon the taking of it : yet I do not altogether condemne the use thereof, but rather approve it as necessary and profitable for the rheumatick and such as are of cold and moist constitution, and in cold and moist seasons, and so as it be taken in congruent manner that is both moderately and seasonably as shall be heereafter shewed, for it helpeth the braine that is over cold and moist, reducing it by its healing and drying facultie unto a temperature : it taketh away rheumes and windenesse of the head, and is profitable for all cold affects of the braine and sinewes, by resolving and consuming the crude and windie superfluities of those parts ; it doth (for a time) expell melancholie and excite lumpish spirits ; it helpeth paines of the teeth, swelling of the gummes, and

aches of the joynts ; it preventeth putrefaction of humours by drying up the crudities of the body and is very profitable upon taking of cold and for all cold and moist affects of the stomach, brest and lungs. It is a speedie remedie upon a surfet, by making a sudden evacuation both upward and downward of such things as are contained in the stomach, and by the like reason it doth in an instant remove windie torments of the stomach, and bowels that proceed of crude humours and helpeth fitts of the mother." The most devoted worshipper of "My Lady Nicotine" could scarcely wish for greater praise of the object of his cult.

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**The Closing
Year.**

THIS being the last issue of the year, we take the opportunity of thanking not only our contributors for the valuable papers which they have, during the year, been good enough to send us for publication, but also our subscribers for the increasing support which they have extended to us. We are always willing to receive and consider any criticisms upon the form and matter of the Journal, and also to endeavour to fall in with suggestions made by our readers as to subjects which might advantageously be treated with in our pages.

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Competitions.

WE are much gratified at the success of our Competitions. It is clear that they have met a want, and have been appreciated as providing a specially valuable form of post-graduate instruction. They have caused a great number of practitioners to refresh their memories upon subjects which had escaped attention for a little time, and, to quote one of our correspondents, "'tis surprising to find how little we remember before we look the subject up." We have been asked by many to publish the correct answers to the questions ; this we are unable to do for the reasons stated in the May issue, but we propose in future to publish the answer that for which the prize is awarded.

The result of the October Competitions is as follows :—The best essay was sent by Dr. C. Shaw Bond, of North Malvern ; and the best answers by Dr. D. Leighton Davies, of Wisbech. Cheques have accordingly been sent to these gentlemen.



Practical Notes.

THE INNERVATION OF THE HEART.—It is well known that heart muscle has in itself the power of rhythmical peristalsis, quite apart from any known nervous mechanism. Gaskell, many years ago, showed that the apex of the ventricle of the heart of a frog, or of a tortoise, possesses no nerve-cells, but that, if it is cut off from the rest of the heart, and bathed with normal saline solution, it will continue to beat rhythmically. The embryo chicken's heart can be seen beating in the vascular area of the blastoderm, long before any nerves have grown into it. The intrinsic nervous mechanism of the frog's heart consists of three main sets of ganglion cells. Those described by Remak are situated at the junction of the sinus venosus with the right auricle, are the most important, and may be called the local inhibitory centre of the heart. It is better, however, to look upon these ganglion cells as the cell-station of the inhibitory fibres, for stimulation of the frog's heart, at the sinu-auricular junction, will cause it to stop in diastole. The ganglion cells, described by Bidder, are situated at the auriculo-ventricular junction, and are considered to be the local accelerator centre. There is a third collection of ganglion cells, described by von Bezold, situated in the inter-auricular septum. These local ganglion cells also exercise a trophic influence over the cardiac muscle.

During life, the rhythmical movements of the heart are controlled and regulated by the extrinsic nerves. These are the cardiac branches of the vagus, and the cardiac branches of the sympathetic nerve. The vagus brings down efferent impulses from the cardio-inhibitory centre, which is placed in the lower part of the floor of the fourth ventricle. The restraining influence of the vagi is being continuously exercised, though the amount of vagus control varies a great deal in different animals. It can be readily shown that, in a cat, or rabbit, the heart may be slowed, or even stopped, if one or both vagi be cut, and the peripheral end be stimulated by a rapidly interrupted induced current.

The action of digitalis stimulates the cardio-inhibitory centre in the medulla, and also the cardio-inhibitory ganglia in the heart itself. The result of this is to slow the heart,

by increasing the length of the diastole, which must, of course, increase the strength of the cardiac systole. The effect of this is, that the veins are emptied, and the arteries of the body filled. In cases of digitalis poisoning, the heart-beat may drop to 40 per minute, though, in some cases, it becomes irregular, rapid and weak, finally stopping in diastole. In other words, death occurs from general circulatory failure. It must, however, be borne in mind that digitalis is *not* to be given, in a routine fashion, for valvular disease of the heart; but that it must be given with reference to the state of the muscular wall of the heart associated with the lesion. Digitalis is indicated in diseases of the heart, when the neuromuscular structures of the cardiac walls fail, so that the circulatory force declines, the arteries are incompletely filled, the veins imperfectly drained, and the blood is accumulated behind the seat of disease. (Mitchell Bruce.)

Muscarine, a poisonous alkaloid obtained from certain fungi, or poisonous mushrooms, produces marked slowing, and in larger doses, temporary or even complete stoppage of the heart; that is, there is prolonged inhibition, due to stimulation of the inhibitory nervous mechanism. This effect may, however, be neutralised by the administration of atropine, although it must be remembered that muscarine will not neutralise the effect of atropine. These drugs, atropine and muscarine, act upon the nerves, and not on the muscular substance of the heart. This was shown by Pickering, who demonstrated that they have no action upon the hearts of early embryos before nerves have grown into the heart. The cardio-inhibitory centre in the medulla may be reflexly stimulated to increased activity by the stimulation of certain afferent nerves; for instance, a blow on the abdomen, or an injury to the testicle, may cause cardiac inhibition and fainting. A blow on the larynx, even though it be a moderate one, may kill the individual. Tobacco smoke, in some instances, by acting upon the vagi terminals in the respiratory system, may reflexly inhibit the heart.

The other efferent nerve to the heart is the sympathetic. Stimulation of the peripheral end of the cut sympathetic nerve in the neck, in the lower animals, produces acceleration and augmentation of the heart beats. It is probable that the augmentor fibres are distinct from the accelerator fibres. In

man, the cardiac branches of the sympathetic nerve travel to the cardiac plexus, and along the coronary vessels to the heart. The cardiac plexus probably contains vasomotor nerves for the coronary arteries, as well as nerves for the heart itself. Belladonna and atropine stimulate the cardio-inhibitory centre in the medulla oblongata, so that the heart becomes slowed. The ends of the vagus in the heart may also be stimulated, thus increasing the inhibitory action of the cardiac centre in the medulla, but the vagi nerve endings are soon paralysed by the prolonged action of the drug, so that the heart beats more rapidly. This is due to the sympathetic nerves acting unopposed by the vagi which are paralysed. In atropine, or belladonna poisoning, death is due to cardiac failure; the ventricles stop in diastole.

The afferent nerve of the heart is the depressor. In some animals, it exists as a separate nerve, anatomically being a branch of the anterior laryngeal branch of the vagus. In man, the depressor fibres run in the vagus trunk. This nerve carries impulses from the heart, or root of the aorta, up to the vaso-constrictor portion of the vasomotor centre, which inhibit the tonic action of this centre, with the result, that the peripheral arterioles in the splanchnic area dilate, and the blood pressure gradually falls. The main function of the depressor nerve, then, is to adapt the peripheral resistance of the arterioles to the action of the heart. In subjects, suffering from angina pectoris, there is present, either general arterio-sclerosis, or localised arterio-sclerosis, involving the root of the aorta, and the coronary arteries. The agonising cramp-like character of the pain, and the suddenness of the onset, suggest involvement of the nerves in the neighbourhood of the heart, and especially those of the cardiac plexuses. It may be that much of the pain, together with the sudden cardiac failure, due to distension of the heart cavities, which sometimes occurs in those persons who are subject to attacks of angina pectoris, is due to want of adaptability between the endocardial pressure, and the resistance in the peripheral arterioles. This is brought about by the morbid conditions, which occur at the root of the aorta, and the general arterio-sclerosis; but especially that of the coronary arteries. It is these morbid conditions which interfere with the normal depressor mechanism. In treating cases of angina pectoris, it is essential, therefore, to use all available

means for lowering the arterial blood pressure, and for relieving the high intraventricular pressure. This may be done by rest and purging; but the drug, which acts most rapidly, is amyl nitrite, which causes the peripheral arterioles to dilate, and accelerates the cardiac action. The same effect may be produced, but much more slowly, by nitroglycerine, given as liquor trinitrin in one minim doses, or in the trinitrin tablets, each of which contains $\frac{1}{100}$ grain of the nitroglycerine. Sodium nitrite may also be given in doses of one to two grains, or erythrol tetranitrate, which is given in from one half to two grain doses, in tablets made with chocolate.

THE TREATMENT OF FRACTURES BY MASSAGE AND EARLY MOBILISATION.—Lucas-Championnière recently gave an exhaustive lecture on this important subject at the Hôtel-Dieu, at which hospital he is surgeon. He claims that "movement is a condition fundamental and necessary for the life and solid repair of the bone. Immobilisation is harmful to the regular development of the callus of fractures." It is well known that, after a fracture, the limb remains for a very considerable length of time weak, and that the joints become stiff. These effects are due to the fact that muscles at rest become atrophied (*disuse atrophy*), also to the cicatricial adhesions, which form between the divided structures; and also to the contraction of the ligaments, which belong to the joints in the immediate neighbourhood. It has been found that these disabilities increase in proportion to the length of time that the limb has been kept absolutely immobilised. The main object of early massage is to prevent these disabilities occurring. If a fracture, followed by displacement, takes place in the shaft of a long bone, the parts must be immobilised by means of suitable splints, either of wood, leather which may be softened first by immersion in the hot water to which a little acetic acid has been added, or paroplastic, which may be readily softened by immersion in hot water. This immobilisation must be kept up for a sufficient time in order to prevent a recurrence of the displacement, then early massage is commenced. The clinical conception, which Lucas-Championnière has formed in the course of a life, full of observations and experiences, has just received an absolutely scientific confirmation by the recent experiments and histological observations of Cornil and

Coudray. Lucas-Championnière has carried out his methods now for just twenty-five years on hundreds of cases, and he formulates these principles:—1. That movement is necessary to the vitality, the repair, and the firmness of the bone. 2. That massage, performed in a particular way, constitutes a special kind of graduated movement, and plays a leading part in the therapeusis of fractures. The massage employed (effleurage) is very gentle, and is never performed at the actual seat of fracture, but around it, and always in the same direction as the venous current. 3. In no circumstances should the massage, or movements produced, cause any pain. The first effect of massage and movements is to cause the pain in the neighbourhood of the fracture to disappear, and, about the same time, the contractions of the muscles around the seat of fracture disappear too. 4. Repair of the injury always takes place more quickly, the extravasated blood is much more rapidly absorbed, the vitality of the skin is maintained, and its functions are preserved.

Supporters of the treatment of fractures by complete immobilisation allege that it is the only condition, which allows of proper rectification, and return to normal shape of the fractured limb, which are indispensable to the perfect function of the limb. Lucas-Championnière states that this is not quite correct. Some deformities are compatible with a proper physiological function. A limb shortened, but not out of its proper axis, a limb, the articulations of which are supple, and whose muscles are not in any way atrophied, is quickly adapted to a satisfactory function, and may be even more useful than one in which the shape is absolutely correct. The muscles, however, are weak and there are adhesions in the joints. On the other hand, there are occasionally slight deformities, persisting after immobilisation, such as displacements of the axis of a limb, and deviation of the foot which will hinder walking. With a very small amount of angular deformity of the bones of the arm or forearm, function may be absolutely lost. Radiography, too, shows that, in many cases, immobilisation has not produced that complete apposition of the fragments of the fractured bone which it was thought to have done. It is a well-known fact that repair takes place quickly in fractured ribs, which can never be completely immobilised. The advantages, then, which are claimed for massage and early

mobilisation in the treatment of fractures, are that there is sound repair with a short period of treatment, that the pain is quickly removed, that muscular contraction disappear early, that there is not the same tendency for adhesions to occur in the neighbouring joints, and, finally, that the muscles do not undergo disuse atrophy. Lucas-Championnière states that some of his last results of this treatment have been obtained in fracture of the olecranon process, which, he states, he has never had occasion to wire; although, on the other hand, for obvious reasons, he advocates early wiring of the patella, when it is fractured transversely. Some surgeons advocate the *ambulatory treatment* of fractures of the lower extremity, which is a method by which the patient has immediate and continued use of the injured limb as a means of locomotion. A plaster-of-Paris splint is applied to the fractured limb, and the first attempt at walking is made during the next few days following the application of the cast. A crutch and stick are used at first, later two sticks are employed, occasionally some patients walk without any support at all. The method is applied mainly to fractures in the neighbourhood of the malleoli, the leg, and the lower end of the femur. Scudder, in his book on the treatment of fractures, states that the advantages claimed for the ambulatory method of treatment are that the time of the patient is saved, that the general health is conserved, and that there is greater general comfort to the patient. In drunkards, the liability to delirium tremens is diminished, and in old persons, the danger of hypostatic pneumonia is lessened, there is less atrophy of the muscles, and the amount of callus is diminished. There is less stiffness of the neighbouring joints, and union occurs at an earlier date. The method itself, in general, seems somewhat unsurgical, for, after all, rest and muscular relaxation are desirable, while the reparative process is in progress. The ambulatory method of treatment is well known in the case of fracture of the shaft of the femur, by the use of a hip splint, assisted by a splint of plaster-of-Paris, the patient being allowed to get about on crutches. The method of treatment, advocated by Lucas-Championnière, seems, however, to be intermediate between the older method of treatment by complete immobilisation, and long rest in bed, and the method included under the title, the ambulatory method.

Novelties and Notices.

ROBB'S SOLUBLE MILK-FOODS.

(Messrs. Alex. Robb & Co., 79 St. Martin's Lane,
London, W.C.)

We have received from Messrs. Robb two preparations of their soluble milk-foods. One food is adapted to the first four months of infant life, and is a substitute for mother's milk. The second food is for babes from four to seven months old. Robb's soluble milk-food is free from starch and cane sugar, and therefore may be given to the youngest infant, when mother's milk is not available, and when the milk obtained from the cow cannot be relied upon. Both foods are easily prepared, and full directions are supplied with each tin.

MOSELEY'S COCOA.

(Foods Limited, Stockport.)

This preparation appears to be a blend of pure cocoa powder and Moseley's food. It is undoubtedly nourishing, agreeable, and easily digestible. It contains the essentials of a good diet, most of the material present being readily soluble in water. It may be safely recommended to invalids and convalescents.

PLEATED COMPRESSED BANDAGES AND DRESSINGS, "TABLOID" BRAND.

(Messrs. Burroughs Wellcome & Co. London.)

The following is a list of pleated compressed bandages, and dressings—"Tabloid" Brand—which are supplied by Messrs. Burroughs Wellcome & Co.:—Pleated bandages, pleated cotton-wool, pleated gauze (double cyanide, 3 per cent., sal alembroth 1 per cent. boric acid), pleated lint (plain, boric acid 40 per cent., carbolised), and pleated carbolised tow. Each neat little packet is wrapped in parchment paper, and has an outer wrapping of tinfoil. To the general practitioner, whose surgical or obstetrical bag is cumbered with large packets of cotton-wool and lint, and loosely rolled bandages, these

compressed goods will undoubtedly prove a great boon. Their compactness and shape enable him to carry in a small space all the necessary dressings for a day's routine practice. The traveller, too, will find this method of carrying bandages and dressings for emergency cases most convenient.

HEMISINE.

(Burroughs Wellcome & Co., London.)

We have before us three convenient preparations of Hemisine :—

(1) A "soloid" product containing Hemisine 0·0002 (approximately $\frac{1}{840}$ gr.) and Atropine Sulphate 0·001 gm. (approximately $\frac{1}{84}$ gr.), suitable for injection, either intravenously or intramuscularly, in cases of cardiac failure.

(2) A "soloid" Hemisine compound c̄ Eucaine No. 2, containing Hemisine 0·0001 gm. ($\frac{1}{840}$ gr.), Sod. Chlor. ·08 gm. ($\frac{1}{14}$ gr.), Eucainæ Hydrochlor. ·02 gm. ($\frac{1}{50}$ gr.) suitable for hypodermic injection to produce local anæsthesia.

(3) Tabloid Hemisine 0·001 gm. ($\frac{1}{100}$ gr.), taken internally, is recommended in cases of subinvolution of the uterus, endometritis, leucorrhœa, and intramural or submucous fibroids.

These preparations are supplied in small phials with suitable directions attached to each phial.

PHYTIN.

(The Society of Chemical Industry in Basle, Switzerland,
and 27A, St. Mary-at-Hill, London.)

We have received from the Society of Chemical Industry in Basle a sample of the new preparation, Phytin. This is stated to be the chief reserve material of green plants, and to have the composition of an acid calcium magnesium salt of anhydrous oxymethylene diphosphoric acid, and to contain 22·8 per cent. of assimilable phosphorus in organic combination. It appears to contain phosphorus in such combination that it is easily assimilated in effective doses. It is supplied in covered capsules, each of which contains a little more than four grains of Phytin. It is of obvious importance that the box in which these capsules are supplied must be kept free from moisture.



COMPETITIONS.

WE offer our readers every month two Prizes on the conditions stated below.

A Prize of Two Guineas will be given to the author of the best Essay on a subject to be announced by the Editor.

A Prize of One Guinea will be given to the competitor who writes the best answers to three questions relating to Medical or Surgical Cases.

Results of the November Competitions will be announced in the January number.

a.—The Subject of the Essay for December will be

The Causes and Treatment of Nocturnal Enuresis.

b.—Answers to the following questions are invited :—

1. What are the affections which occur in the joints as the result of congenital syphilis?
2. What are the causes and symptoms of hæmatomyelia?
3. A male, æt. 50, was admitted to hospital suffering from fits. He had always been temperate, and had never had syphilis. Four months before admission he fell, striking his head on the ground. The fall produced on his head a lump, which was said to vary in size. He was not unconscious, and seemed none the worse for the accident, but two weeks after, when getting out of bed one morning, he made a choking noise, and fell forward in an unconscious state. He recovered in a quarter of an hour, but in two days had another fit, which started with twitchings in the muscles of the right hand and right side of his face, and became unconscious. Three weeks afterwards he had a similar attack. During the last two weeks, he has had three fits and has lost flesh. On admission, he was found to be anxious-looking, thin and irritable, answering as a rule in monosyllables. Over the left parietal region there was found a hard well-defined swelling, about three inches in circumference. Pressure on it caused pain. H.S.N., L.S.N., urine normal. Arms and legs move well, right knee-jerk active, left less active. Plantar reflexes equal and active. Sensations normal. Tongue protruded to the right. During spasm the right angle of the mouth is drawn up. Pupils react to light and accommodation. Right disc was indistinct, the left swollen. Has difficulty of swallowing. Twenty days after admission, there was marked weakness in the right hand. The next day the patient suddenly became unconscious, and remained so for fifteen minutes, during which time breathing became stertorous, and there was conjugate deviation of the eyes to the left.

What treatment should be adopted?

GENERAL CONDITIONS.

A.—All MSS. relating to the Essay must be marked on the top left-hand corner "Essay," and must be sent to the Editor of THE PRACTITIONER, 149, Strand, W.C., on or before the 1st day of January, 1906. The answers to the above Questions must not exceed eight hundred words, and the best answer will be published in due course.

B.—All MSS. giving answers to the Questions must be marked on the top left-hand corner "Questions," and must be sent to the Editor on or before the 1st day of January, 1906.

C.—No Essay will be returned unless a special request is made, accompanied by a stamped addressed envelope.

A and B.—(1) One side of the paper only must be written on.

(2) The name, or pseudonym, and address of the competitor must be clearly written on each sheet of paper used.

(3) The decision of the Editor is final.

(4) Competitors must be registered General Practitioners.

(5) The attached Coupon must be filled up by each competitor.

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